

ALAGAPPA UNIVERSITY

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KARAIKUDI – 630 003
Tamil Nadu, INDIA



DIRECTORATE OF DISTANCE EDUCATION

(Recognized by Distance Education Council (DEC), New Delhi)

Master of Business Administration



Paper 4.2.2

Investment Analysis and Portfolio Management

INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT

DIRECTORATE OF DISTANCE EDUCATION

MBA
Paper 4.2.2



ALAGAPPA UNIVERSITY
Karaikudi - 630 003 Tamil Nadu

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SYLLABI-BOOK MAPPING TABLE

Investment Analysis and Portfolio Management

Syllabi	Mapping in Book
UNIT 1 **Investment:** Investment Concepts and Goals - Types of investment - Financial - Real-Business - Personal - Institutional - Comparison of investments, speculation, gambling - Hedging - Concepts of portfolio and portfolio management - Goals - Risk and return trade off - Financial investment avenues - Fixed income - Varying income securities - Derivative Instruments.	**Unit 1:** Investment **(Pages 3-60)**
UNIT 2 **Investment Analysis:** Aspects of Analysis - Return analysis - Concepts, measures and computation of return of individual security and portfolio - Risk analysis - Concepts, types, measure, computation of risk of individual security and portfolio - Valuation analysis - Share valuation - Bond value - Price earnings analysis.	**Unit 2:** Investment Analysis **(Pages 61-110)**
UNIT 3 **Approaches to Investment Analysis:** Fundamental analysis - Concept and components - Tools of economy, industry and company analysis - Technical analysis - Concept and tools - Assumption - Theories - Dow theory - Contrary opinion - The confidence index, breadth of market and strength analysis - Moving average analysis - Chart patterns.	**Unit 3:** Approaches to Investment Analysis **(Pages 111-162)**
UNIT 4 **Portfolio Construction and Choice:** Markowtz diversification - Efficient frontier - Risk-return indifferent curves - Portfolio choice - Sharpe's Single and two factorial models - Lagrange multiplier method.	**Unit 4:** Portfolio Construction and Choice **(Pages 163-192)**
UNIT 5 **Capital Asset Pricing Model:** Assumptions and application - Capital market line and security market line - Efficient market hypotheses - The weakly efficient, semi strongly efficient and strongly efficient market forms - Random-Walk theory.	**Unit 5:** Capital Asset Pricing Model **(Pages 193-220)**
UNIT 6 **Portfolio Performance:** Measures: Sharpe, Treynor and Jenson - Portfolio audit and Portfolio revision - Need and methods - Formula plans.	**Unit 6:** Portfolio Performance **(Pages 221-240)**

CONTENTS

INTRODUCTION

NOTES

Investment in securities like stocks, debentures and bonds is challenging as well as it results in profits. Although it has rewards involved but so does it has risks. Venturing into this field requires knowledge that is based on science, along with artistic skill. These types of investments combine both, rational as well as emotional responses. Investment in financial securities is like a coin which has the best investment venue on one side and the highest risk venue on the other.

It is not common to find investors who invest all their savings in one security. Ideally, they use it on a group of securities. This group of securities is referred to as a portfolio. A portfolio is created to cut down risks without reducing returns. Portfolio management is concerned with analysing individual securities and also with the activity of bringing securities together to form portfolios, for optimum benefits. An investor who has a good understanding of the basic methods and analytical aspects of portfolio management is more likely to succeed.

The aim of this book, *Investment Analysis and Portfolio Management,* is to familiarize the reader with the theoretical and empirical aspects of investment management. The topics covered in this book include Investment and its sources and associated risk, analysis and valuation of stocks, technical analysis and efficient market hypothesis, portfolio management, CAPT and APT, portfolio evaluation and revision.

Each unit of the book begins with an introduction, followed by unit objectives. They introduce the students to the text and provide an overview of important concepts and topics. Numerous figures and tables highlight important points and expand on discussion of the text to aid in the understanding of key concepts. 'Check Your Progress' questions ensure that the concepts have been understood well. Questions and Exercises section encourages for recollecting information as well as the application of concepts.

UNIT 1 INVESTMENT

NOTES

Structure

1.0 INTRODUCTION

Why must we invest? Investment is relatively painless, and its rewards are abundant. You want to invest in order to create wealth. Investment is the best way to secure your future. In this world, there are two ways to earn income; one is to exchange your labour for money (offering your service to some person/organization) and the other is to have your money earn money for you (investing your saved money). Investment means putting money to work to earn more money. By investing, you will have a lot more money for leading a comfortable post- retirement life, providing quality education to your children, fulfilling your social obligations, etc. You could pass on your wealth to the next generation. Do not you wish to be remembered as your family's most treasured ancestor?

Thus, almost all of us save a part of our earnings for the future. The money that we earn with all the hard work should work even harder to make more money for us. Our savings are invested in various ways, such as in banks, in shares, in bonds, in metals, in land and properties and in insurance. The form of investment depends upon

the risk (there is always some risk involved when you invest) and return associated with it and with the attitude of the investor/s. It also depends upon the purpose for which such investments are made.

NOTES

Investing together in securities, such as stocks, bonds and money market instruments, in order to obtain an optimum return with minimum risk is called portfolio construction. Diversification of investments helps to spread risk over many assets. A diversification of securities gives the assurance of obtaining the anticipated return on the portfolio. In a diversified portfolio, some securities may not perform as expected, but others may exceed the expectation and make the actual return of the portfolio reasonably close to the anticipated one. Keeping a portfolio of a single security may lead to a greater likelihood of the actual return being somewhat different from that of the expected return. Hence, it is a common practice to diversify securities in the portfolio.

In this unit, you will also learn about derivative instruments. Derivatives have been traded for centuries. For almost three hundred years, the main derivative instruments were commodity-linked derivatives, particularly commodity forwards which were meant to hedge the risk arising out of fluctuations in commodity prices. The growth of the derivatives market remained limited due to the credit risk involved. Markets for derivative instruments emerged and developed to enable risk-averse investors to protect themselves against risk arising out of fluctuations in asset prices. Derivatives facilitate hedging of price risk that is present when one holds inventory of some item or when one enters a financial or commercial transaction. They serve to lock-in the prices of assets.

1.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Explain the concepts and goals of investment
- Identify the various types of investment
- Compare investments, speculation and gambling
- Discuss the features of hedging
- Understand what a portfolio is
- Manage your portfolios
- Identify the various investment avenues available to an investor
- Explain the characteristics of various derivatives instruments, such as futures, forwards, options and swaps

1.2 INVESTMENT CONCEPTS AND GOALS



Investment: Investment is the employment of funds on assets with the aim of earning income or capital appreciation

Investment is the employment of funds on assets with the aim of earning income or capital appreciation. Investment has two attributes, namely time and risk. Present consumption is sacrificed to get a return in the future. The sacrifice that has to be borne is certain but the return in the future may be uncertain. This attribute of investment indicates the risk factor. The risk is undertaken with a view to reap some return from the investment. For a layman, investment means some monetary commitment. For example, a person's commitment to buy a flat or a house for his personal use may be an investment from his point of view. This cannot be considered as an actual investment as it involves sacrifice but does not yield any financial return. Investment is postponement

of consumption so that the effected savings generate a stream of returns or one-time return or both.

1.2.1 Meaning of Investments

NOTES

Investments may be defined as a commitment of one's money in one or more of asset classes in anticipation of some gains while simultaneously bearing risk of uncertainty. To the economist, investment is the net addition made to the nation's capital stock that consists of goods and services that are used in the production process. A net addition to the capital stock means an increase in the buildings, equipments or inventories. These capital stocks are used to produce other goods and services.

Financial investment is the allocation of money to assets that are expected to yield some gain over a period of time. It is an exchange of financial claims such as stocks and bonds for money. They are expected to yield returns and experience capital growth over the years.

The financial and economic meanings are related to each other because the savings of the individual flow into the capital market as financial investments, to be used in economic investment. Even though they are related to each other, we are concerned only about the financial investment made on securities.

Secure investment, gambling and speculation

Following qualities are essential for a commitment to be known as a 'secure investment':

- It expects gains while bearing associated risks.
- It is based upon thorough analysis.
- It has a high degree of security of returns and principal.

On the basis of aforementioned properties, you can differentiate gambling from investing. Gambling would refer to a commitment when following properties exist:

- It expects gains while bearing associated risks
- It is not based upon analysis.
- It does not ensure any safety and surety of principal and return.

Similarly, there are speculative investments that can be termed as a commitment of money when:

- There are expectations of gains while bearing associated risks.
- Thorough analysis is involved.
- There is no safety and surety of principal and return.

Example 1.1:

Categorize the following activities into secure investment, gambling and speculation.

1. Investment in a fixed coupon government security after thorough analysis
2. Investment in a bank's fixed deposit after thorough analysis of bank's financials
3. Investment in gold bullion after thorough analysis
4. Investment in common equity stocks after thorough analysis
5. Investment in preference shares after thorough analysis
6. Investment in a residential or commercial real estate without thorough analysis
7. Betting on horse racing

NOTES

Solution:

1. Since it possesses qualities such as expectation of gain, safety and analysis, it can be termed as secure investment.
2. Same as answer for 1.
3. This investment possesses properties such as expectation of returns and risk; thorough analysis is involved; there is no safety of principal and returns. Thus, it can be considered as a speculative investment.
4. Same as answer for 3.
5. Preference shares command reasonably high degree of safety in returns and principal. Hence, they can be considered as secure investment.
6. Since there is no inherent safety of principal and no analysis is involved, it can be considered as a 'gambling'. Having said that, it does not mean that there is no possibility of returns, there could be, but at the cost of high risk. As per common experience, it can be inferred that most residential investments fall in this category because investors either do not possess the ability to analyse or turn a blind eye to it.
7. This action is surely considered a gambling activity. It depends on how skilled the gambler is.

Analytical reference 1

Table 1.1 shows the average returns of investment classes, such as equities, gold and government securities and short term bills in US markets over a fairly long period of time:

Table 1.1 *Analysis of US Markets (1928 - 2011)*

Time Horizon	Average Returns	Chances of making a loss
1 Year	10.81%	29%
3 Year	11.04%	17%
5 Year	11.37%	12%
7 Year	11.52%	6%
10 Year	11.80%	5%
15 Year	12.25%	1%
20 Year	12.19%	0%

Observations

- Above table shows the returns attributable to time horizon and associated risk of making a loss.
- Probability of making a loss with 1 year horizon was 29% whereas with 15 years horizon the same probability reduces to 1%.
- What is not so obvious that average returns also increase with the time horizon, though not so significantly.

Conclusions

- Hence it can be concluded that investors having long term horizon in equity market almost never suffered a loss in USA.

NOTES

- A longer time horizon, while making investments, can reduce risk without adversely affecting returns.

Analytical reference 2

The data of returns of four major asset classes in the US is given in Table 1.2.

Table 1.2 *Analysis of Returns in USA are 1968-2011*

	Gold	Equity	Treasury Bills	Government Securities
Geometric Mean Return (%)	10.35	8.26	5.02	6.68
Arithmetic Mean Returns (%)	11.49	10.76	5.43	8.03
Risk (%)	27.65	17.55	3.08	9.78

Source: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histret.html

Observations

- Gold and Equity are said to be riskier assets than T-Bills and G-Secs, the same is being reflected here.
- As per data above Gold has been riskiest of all and T-Bills the safest.
- Risk and return are in perfect tandem with each other since the riskiest asset (gold in this case) earned the highest returns and safest investment (T-Bills in this case) earned the lowest returns.

Conclusions

- In long run, more risky asset classes are awarded with more returns and vice versa.

1.2.2 Scope of Investments

History of making investments traces back to human existence when it first developed tools and equipments to hunt or survive. One of the most rewarding investments in early stages was in lives stocks that had regular income generating capacity.

In financial context, investments have enormous scope today and options range from direct business investments, equities, and fixed income to structured derivatives with highly innovative and customized pay off pattern.

Financial markets, recently, have witnessed a spur in creation of variety of innovative instruments around the world. The main causes behind such a growth in universe of financial instruments are economic growth, deregulation of financial markets, spread of financial education and globalization of world economies.

However, the developing markets such as India lag in this race of financial innovation and advancement primarily due to tight control over financial markets. Lack of innovation and tight control is not a pure curse though; it has saved India many times from the external global shocks. The 2008 financial crisis in US is also attributed to innovative financial instruments that went bad in tough times.

India has still seen a steady and stable growth and innovation in markets for financial instruments and various new products are being launched every year. One reason behind such natural growth is the robust savings and investment rate that India has. As we all know that *investments are a vehicle that channelizes savings into productive avenues*, a high savings culture has led to high scope for investments.

NOTES

Figure 1.1 gives the graph depicting the Gross Domestic Savings for select countries in terms of percent of Gross Domestic Product of respective nations. Turkmenistan tops the score with 85% and India's GDS is 31% of its GDP. UK and USA save just around 11 to 14% of their respective GDP.

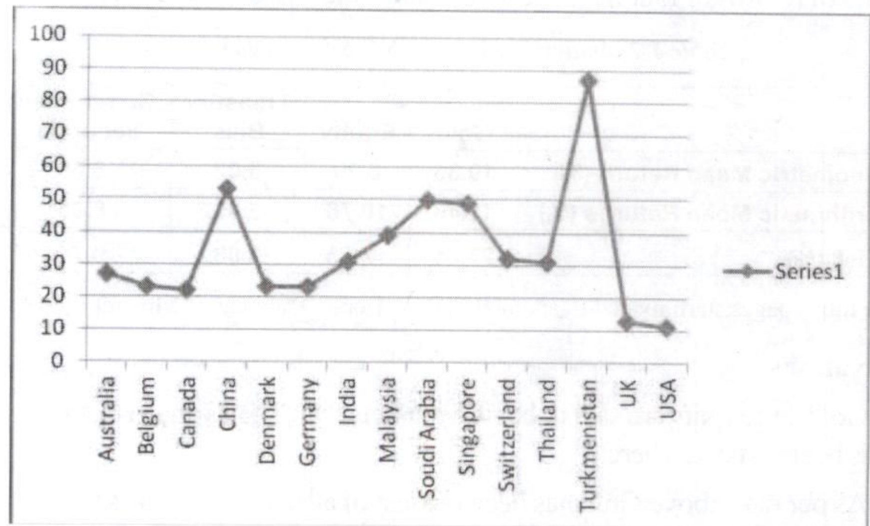


Fig. 1.1 *Gross Domestic Savings of Selected Nations in Percent to Gross Domestic Product*

Source: http://data.worldbank.org/indicator/NY.GDS.TOTL.ZS, 17th Mach 2013.

Investments can have a really wide range of possible categories. Here we shall categorize the huge range of investment alternatives:

Short-term Investment vs Long-term

It's a relatively simpler categorization, division on the basis of time horizon of an investment. What is not so simple is to quantify short term and long term. There are many notions that define time duration as being short or long. In reality it is a subjective answer.

In case of a stock, for example, long term should be a period when negative and positive outcomes, both have fair probability of having occurred. That means a sufficiently large time period during which share can complete a full cycle of returns that is ups and downs. Generally such time period would coincide with length of an economic cycle, approximately ranging between 10 to 15 years.

Similarly for fixed income securities where returns are more or less known, long term can be a time above 3 to 5 years. Short term would be generally less than 2 years. As said earlier, it's a perception that what is long term or short term!

What is more important is to understand that riskier investments require longer time horizon than safer ones. It pays off to hold riskier investments in long run as shown in one of the analytical references earlier.

Direct Investments vs Pooled Investments

Direct investment, as the name itself suggests, refer to investment made by the investor directly into the asset class.

Pooled investments, however, are not directly made by the end investor, but an expert who invests on behalf of multiple small investors through a single vehicle. Such



Direct investment: Direct investment, as the name itself suggests, refer to investment made by the investor directly into the asset class

instruments are known as pooled investments, for example mutual funds, portfolio management services, REITs, ETFs etc.

Pooled investments have a major advantage that management of money lays in expert hands but in trade of extra cost of managing them.

NOTES

Active style vs passive style

Investments management is said to be ***passive*** in following two cases:

- **Buy and Hold Portfolio strategy:** Commencing no changes in portfolio even if markets change wildly.
- **Tracking Portfolio strategy:** In this case the manager tracks a predetermined benchmark and only changes made in the portfolio are to match changes in benchmark itself. Benchmarks can be a standard popular index or a customized set of various assets decided well in advance. Some examples are:
    - o *Standard Popular Index:* Nifty Fifty, BSE-500, S and P 500 BSE-Greenex, BSE-Power, BSE-Auto, CNX Nifty Junior etc
    - o *Custom created benchmark:* 50% of Nifty Fifty and 50% of CNX Nifty Junior

Investment strategy is said to be ***active*** when investment manager is free to the composition of his portfolio and does not necessary have follow to follow any predetermined benchmark.

Comparison between active and passive style

In case of a passive investment strategy, the manager is judged on basis of his efficiency in perfectly following benchmark, and returns are just not a criterion. Whereas in case of active investment strategy, the manager is judged on the basis of excess returns (naively known as *alpha*) generated in comparison to the benchmark.

Followers of passive style believe that it's better to follow the markets than to try to outperform it because markets are way too efficient and cost of conducting research and analysis on markets will be a pure wastage.

However followers of active investment strategy believe that markets are often inefficient and leave enough room to outperform it. By conducting a thorough research and analysis, one can generate more returns than overall average of markets. Such strategist try to find stocks that are grossly undervalued or mispriced that market participants at large did not notice.

Illustrative case

Mr A and Mr P, are analyzing Nifty Fifty and conclude that it is expected to deliver a return of 18% over next one year. Mr A believes that there are many underpriced securities with in Nifty Fifty but Mr P believes that amongst such intense hunt for undervalued securities by many other analysts, it is impossible to find one.

Mr A decides to not to follow the index and develop a portfolio of securities that he believe are undervalued at present market prices whereas Mr P builds a portfolio of securities that exactly mirrors the composition of securities in his benchmark, Nifty Fifty.

NOTES

After one year it is observed that Nifty Fifty actually delivered 18% returns. Since Mr P was following this benchmark to perfection, he obviously delivers 18% returns in his portfolio. However it was interesting to look at the returns that Mr A generated.

- *If Mr. A generates 3% returns only:* In this case it can be concluded that Mr A had poor intuition and research skills to find out if stocks are undervalued or not
- *If Mr. A generates 17% returns:* In this markets should have been too efficient and despite superior research skills of Mr. A he could not generate excess returns. The underperformance of 1% can be attributed to cost of conducting research and analysis.
- *If Mr. A generates 26% returns:* In this case it can be safely concluded that Mr. A was right that markets are inefficient and there is plenty of room to outperform it. Moreover Mr. A possesses superior research skills to spot undervalues stocks.

Discretionary and non-discretionary investments

This categorization holds true where management of portfolio is outsourced to an expert by the owner of money.

In case of **discretionary** investments, the manager has *discretion of deciding investment mix without ongoing approval of the investor*. In such cases investor entrusts the manager with all decision making authorities well in advance. Even in discretionary investments, manager has to always act in good faith of the client and be within boundaries defined in advance.

In case of **non-discretionary** investments, manager does not enjoy decision making rights. Manager can take buying or selling decisions in the portfolio only after explicit approval of the investor for every transaction. In such cases investors have tight control over the portfolio and decision making is sluggish. Investment manager primarily acts like an advisor in this case.

Mutual funds are an example of discretionary portfolio whereas portfolio management services provided by banks or brokerage houses are example of a nondiscretionary investment.

Systematic investments vs lump sum investments

An investment made by onetime outflow of money is known as a **lump sum investment**, whereas a set of outflows in various recurring frequencies (or installments) is known as a **systematic investment**.

One can choose any of these modes in almost type of investments. However, both modes of investing have their own merits and demerits.

Lump sum investing does not require a cash flow planning for future because no future commitment towards investment is pending. But it puts the investor at market timing risk, because markets could be grossly overvalued when this money is invested and a subsequent fall can hurt the portfolio value.

Systematic investments on the other hand, take care of market timing risk because money is invested at various market levels in staggered manner. A wild swing in prices

of securities would not affect the portfolio significantly because investor would end up buying more units if prices fall and less units if prices rise. This concept is also known as 'rupee cost averaging'.

NOTES

Analytical reference: Systematic vs lump sum investment approach *(Risk and return implications)*

Scenario A: If markets are volatile.

Table 1.3 Case with Lump Sum Investment

Case with lump sum investment			
Column A	Column B	Column C = B ÷ A	Column D = Σ [C×A]
Security Price (₹)	Investment Amount (₹)	Units of security bought	Cumulative Portfolio Value (₹)
100	1,134,000	11340.00	1134000
90	-		1020600
80	-	-	907200
70	-	-	793800
60	-	-	680400 → Maximum Loss Point: –40%
75	-	-	850500
100	-	-	1134000
125	-	-	1417500
150	-	-	1701000 → Maximum Gain Point: +50%
TOTAL	**1,134,000**	**11340.00**	**NA**

Table 1.4 Case with Systematic Investments: Rupee Cost Averaging

Case with Systematic Investments: Rupee Cost Averaging				
Column A	Column B	Column C = B ÷ A	Column D	Column E = Σ (C×A)
Security Price (₹)	Investment Amount (₹)	Units of security bought	Total Number of units in possession	Cumulative Portfolio Value (₹)
100	126,000	1260.00	1260.00	126000
90	126,000	1400.00	2660.00	239400
80	126,000	1575.00	4235.00	338800
70	126,000	1800.00	6035.00	422450
60	126,000	2100.00	8135.00	488100 → Maximum Loss Point: –22.5%
75	126,000	1680.00	9815.00	736125
100	126,000	1260.00	11075.00	1107500
125	126,000	1008.00	12083.00	1510375
150	126,000	840.00	12923.00	1938450 → Maximum Gain Point: +71%
TOTAL	**1,134,000**	**12923.00**	**NA**	**NA**

Note: gains are higher & losses are lower than lum sum strategy

Analysis of Scenario A

- Note, in both the cases principal invested is the same, only difference is in the manner of investing money, i.e. Lump sum and systematic.
- It absolutely clear that systematic approach has lower risk but higher returns than lump sum approach.
- Investor has higher net worth in case of systematic approach.

NOTES

Scenario B: Upward trending market

***Table 1.5** Case with Lump Sum Investment*

Case with lump sum investment			
Column A	Column B	Column C = B ÷ A	Column D = Σ (C×A)
Security Price ₹	Investment Amount ₹	Units of Security Bought	Cumulative Portfolio Value ₹
100	1,134,000	11340.00	1134000
110	-	-	1247400
140	-	-	1587600
170	-	-	1927800
150	-	-	1701000
190	-	-	2154600
210	-	-	2381400
240	-	-	2721600
250	-	-	2835000
TOTAL	**1,134,000**	**11340.00**	**NA**

Maximum gain Point: +150%

***Table 1.6** Case with Systematic Investments: Rupee Cost Averaging*

Case with Systematic Investment: Rupee Cost Averaging				
Column A	Column B	Column C = B÷A	Column D	Column E = Σ (C×A)
Security Price ₹	Investment Amount ₹	Units of security Bought	Total Number of Units in possession	Cumulative Portfolio Value ₹
100	126,000	1260.00	1260.00	126000
110	126,000	1145.45	2405.00	264600
140	126,000	900.00	3305.45	462764
170	126,000	741.18	4046.63	687927
150	126,000	840.00	4886.63	732995
190	126,000	663.16	5549.79	1054460
210	126,000	600.00	6149.79	1291456
240	126,000	525.00	6674.79	1601949
250	126,000	504.00	7178.79	1794697
Total	**1,134,000**	**7178.79**	**NA**	**NA**

Maximum Gain Point: + 58%

Analysis of Scenario B

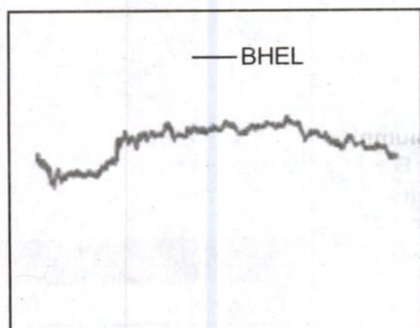
- In this case of an upward trending security prices, systematic investment approach does not outperform the lump sum approach

Scenario C: Real market data of five major stocks (1st Sept, 2008 to 30th Aug, 2011)

When you observe the analysis of share prices of BHEL (Figure 1.2), HDFC (Figure 1.3), NTPC (Figure 1.4), Hero Motocorp (Figure 1.5) and ONGC (Figure 1.6) for a period of three years, You will note that share price data has been adjusted for impact of share splits. Moreover an imaginary interest rate @ 8% PA has been added in calculation of systematic investment return on the amount not invested during the process.

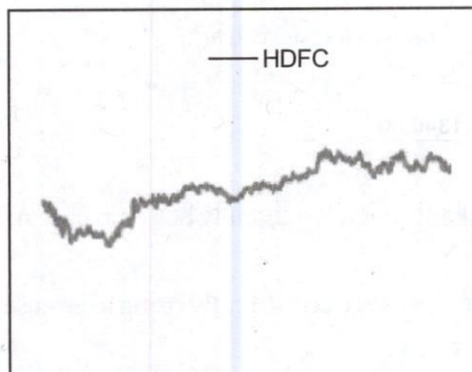
For detailed analysis of readers, a pattern of price movement is attached along with the table showing comparison between lump sum approach and systematic approach.

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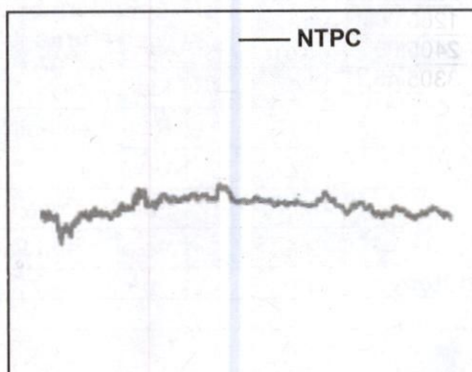
BHEL	
Principal	1000000
Lump sum return	4.75%
SIP Return	1.09%

Fig. 1.2 *BHEL's Price Movement*



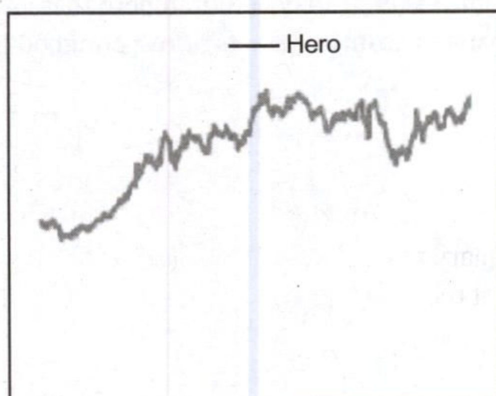
HDFC	
Principal	1000000
Lump sum return	42.44%
SIP Return	45.37%

Fig. 1.3 *HDFC Ltd's Price Movement*



NTPC	
Principal	1000000
Lump sum return	–1.53%
SIP Return	0.32%

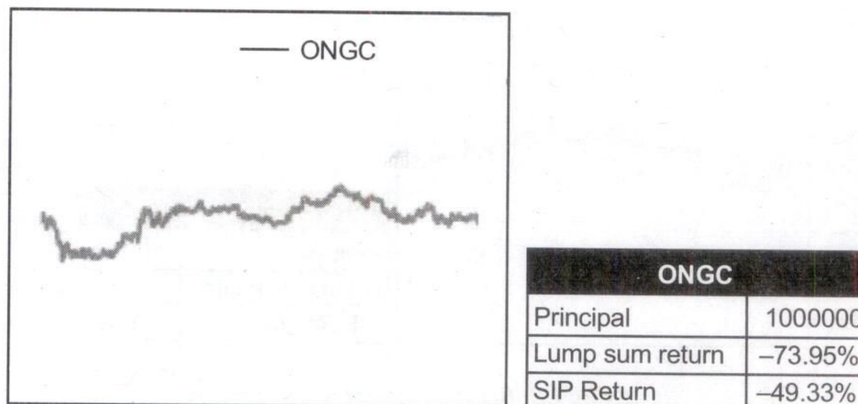
Fig. 1.4 *NTPC Ltd's Price Movement*



Hero Motocorp	
Principal	1000000
Lump sum return	139.26%
SIP Return	55.01%

Fig. 1.5 *Hero Motocorp Ltd's Price Movement*

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ONGC	
Principal	1000000
Lump sum return	–73.95%
SIP Return	–49.33%

Fig. 1.6 ONGC Ltd's Price Movement

Analysis of Scenario C

- The analysis is summarized in Table 1.7.
- It shows systematic investment approach is generally better in case of volatile, flat and trend less markets.
- Lump sum is best suited if share prices are consistently rising as in case of Hero Motocorp Ltd.

Table 1.7 Stock Return Comparison

Company	Lump sum Return	Systematic Investment Return	Pattern of returns
NTPC	-2%	0%	Flat
BHEL	5%	1%	Rise then Fall
Hero Motocorp	139%	55%	Uptrend
HDFC	42%	45%	Fall then rise
ONGC	-74%	49%	Volatile and flat
Cells in green reflect better strategy			
Source: BSE			

Classification of Investments

Investments can be classified in five broad categories: securities, commodities, real assets, contracts and currencies (Figure 1.7). It may be noted here that although commodities have been classified separately from real assets below, commodities are still a sub part of real assets.

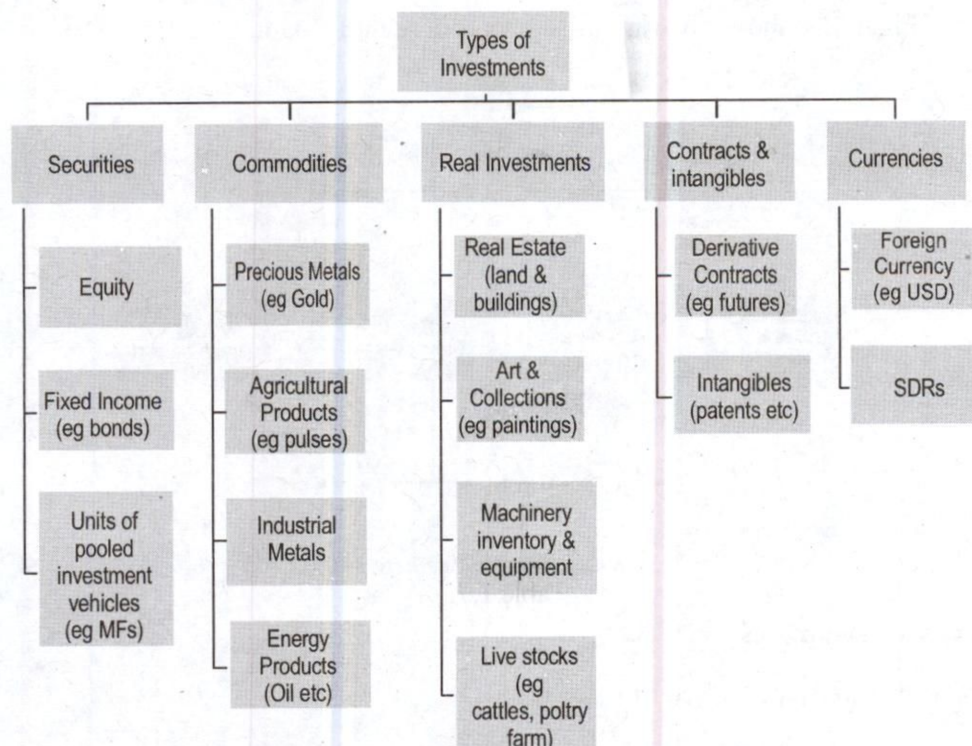


Fig. 1.7 Classification of Investments

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Securities

For an issuer, securities are a medium of raising money from the investors. Issuer can be a government, an individual or a company. Securities include bonds, government securities, treasury bills, Commercial Papers, certificate of deposits, equity shares, preference shares, warrants, depository receipts and units of pooled investments vehicles (PIV). These can be divided in three categories: Equity, Fixed Income and units of PIVs.

Security transactions that directly take place between the issuers and investors come under the purview of primary markets. *Fresh issuance* of equity shares (IPOs, Right Issues), preference shares and debt securities are typical transactions in primary markets.

Securities once issued in primary market can subsequently be traded amongst other investors, traders or arbitrageurs; such transactions form part of ***secondary markets.***

Both forms of markets complement each other. In biological sense, securities take birth in primary markets and are nurtured in secondary markets. Mind, it is only the transactions in primary markets that directly help in building productive capacity of an economy and count in national capital formation. Secondary markets on the other hand provide liquidity, growth and incentives for investors of primary markets.

There are two more facets of security markets: ***Capital market and Money Market.*** This division is created on the basis of time to maturity of the security. Securities with time horizon of more than one year fall in category of capital markets and instruments with time horizon of less than 1 year in money markets.

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Figure 1.8 shows the various segments of security market.

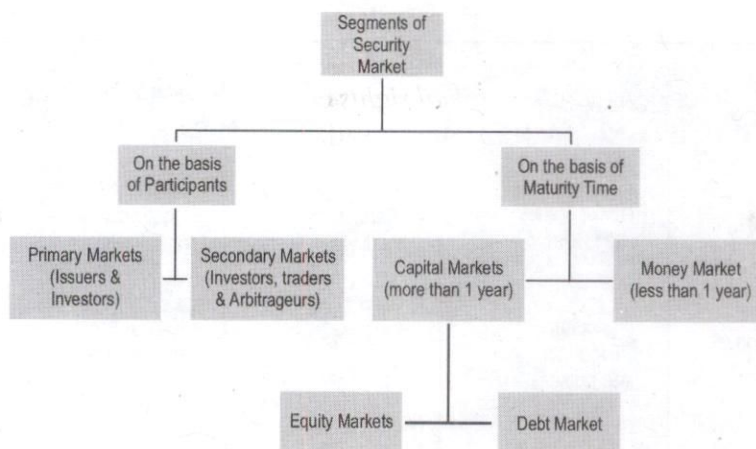


Fig. 1.8 *Segments of Security Market*

Types of securities

There are three types of securities.

(i) Equity securities

The most commonly talked (however, generally the most commonly misunderstood) category of investments is equity investments. Literal meaning of equity is 'justice and fairness'; however, in finance, the word equity represents the ownership in any asset. Equity share, in a similar manner, represents ownership in a business.

Each share denominates certain ownership in the company. Promoters, who wish to retain control over the company should retain majority of common shares as well.

There are two types of equity shares: Common stocks and Preferred stocks (Figure 1.9).

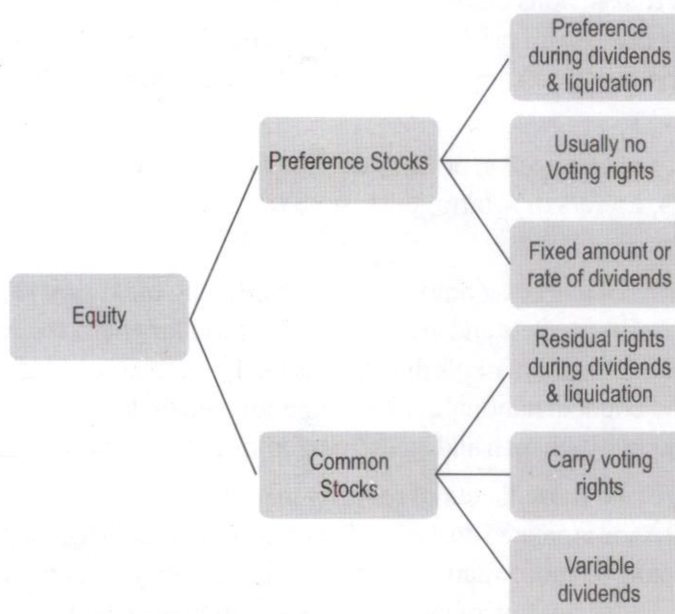


Fig. 1.9 *Types of Equities*

Difference between the two forms is significant, so much so that investors virtually perceive only one of them as an equity share and the other as a debt security. Let's explore which one and why.

(a) **Common stocks** have *residual rights* because their claims on all benefits and assets of the company are only after other capital provider's claims have been settled. They are entitled to dividends only after the interest and preference share dividends have been paid to debt holders and preference share holders. Similarly in case of liquidation of a company, first settlement is done with debt holders, then comes preference shareholders and in the end the common shareholders. Common stocks however carry the voting rights that no other capital provider generally gets.

(b) **Preferred stocks** as the name itself suggests, are given preference over common stock in case of payments of dividends or liquidation proceeds. But preferred stocks usually do not carry voting rights. Preferred stocks usually carry a fixed amount or a rate of dividends.

Due to such safety features, preferred stocks are virtually treated like a debt security by investors.

(ii) Fixed income securities

Future cash flows are well defined in case of fixed income securities. Amount of interest, its frequency, time to maturity and return of principal are some of such clauses that are contractually defined well in advance.

Relative safety of interest and principal is the main motivation for investors into these securities.

Fixed income securities can be further classified on the basis of their time to maturity (Figure 1.10).

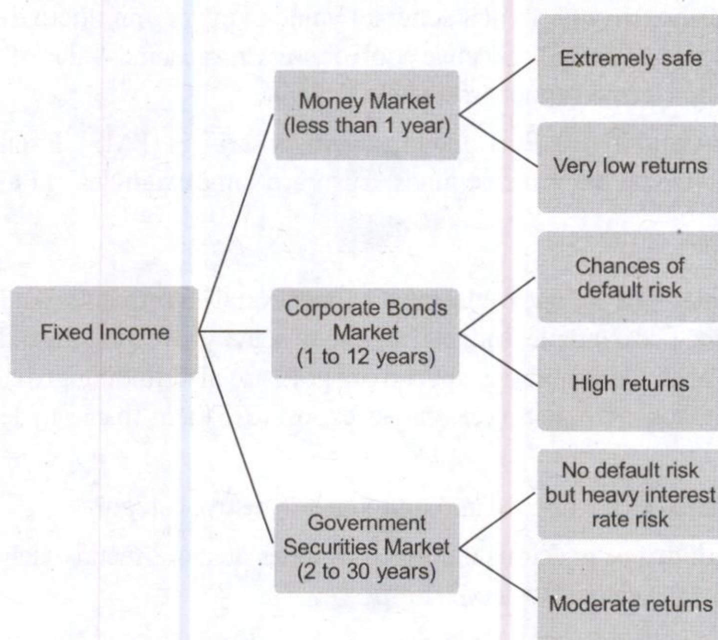


Fig. 1.10 *Fixed Income Securities*

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Corporate bonds: The debt instruments issued by companies for a maturity ranging between 1 to 10 years



Government securities (G-Secs): These are long term securities issued by state or central government



Pooled investment vehicles (PIV): Pooled investment vehicles (PIV) are the instruments that collect investible money from various investors and invest according to predetermined strategy.

(a) **Money market securities:** These instruments have maturity of less than one year and their main utility is to enable short term parking of idle cash lying with investors such as banks, companies, government and PIVs. These markets are highly liquid and safe.

(b) **Corporate bonds:** The debt instruments issued by companies for a maturity ranging between 1 to 10 years. While selecting a bond, it is important to consider the credit profile of issuer. It is reflected in the credit rating of the particular bond issue or issuer itself.

(c) **Government securities (G-Secs):** These are long term securities issued by state or central government. When government issues securities denominated in domestic currency, chances of default are almost nil. However due to long maturity periods, prices of these securities fluctuate wildly in response to a change in market interest rates. This trait is also known as *interest rate risk or market risk or duration risk* of government securities.

Table 1.8 *Money Market Instruments*

Issuer	Instrument
Government	Treasury Bills
Companies	Commercial Papers
Banks	Certificate of Deposits

(iii) Units of pooled investment vehicles (PIV)

Pooled investment vehicles (PIV) are the instruments that collect investible money from various investors and invest according to predetermined strategy. *Investment decision making is essentially outsourced* by investors to an expert who vows to manage money in best interest of investors with in constraints defined in advance.

Unit of a PIV is like a share that represents ownership of in investor in collective pool of assets held in a particular scheme. Value of every unit fluctuates exactly in proportion with the value of collective pool of assets in a scheme. Value of an individual unit is also often termed as net asset value (NAV).

Mutual funds (MF), Portfolio management services (PMS), Exchange traded funds (ETF), depositories, hedge funds, trusts are some examples of PIVs.

Commodities

In fact, commodities are one of the most conventional investments that have existed with investors. For example, Indians have been heavily investing in gold since many centuries in past. Commodities apart from gold are also finding growing space in investor portfolios as it is getting easier gain exposure to them, thanks to dematerialized facility.

Commodities are divided into four non-exhaustive categories:

1. **Bullions or precious metals:** It includes precious metals such as Gold and Silver excluding their coin form
2. Agricultural products such as cereals, pulses etc.
3. Industrial metals such as copper, steel etc.
4. Energy products such crude oil

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Commodities prices are linked to demand and supply factors which are different for different commodities. Their value lies in their utility for end users.

Traditionally commodities are said to be a good hedge against inflation as their returns have historically just beaten inflation. However investors seeking high portfolio growth from commodities must have exceptional skills.

Commodities also enjoy low correlations with other financial investments and hence provide a great deal of diversification and risk reduction in portfolio.

Real Assets

This is another conventional set of investments with really old investment history. This group comprises real tangible assets with simultaneous usability value for the owner. There is always a psychological advantage of holding these assets, which might not necessarily result in higher returns. Some classifications of real investments are given as follows:

1. Real Estate including land as well as buildings of residential or commercial nature. Investments in real estate can be mad in direct form by directly buying it or indirect form by buying securitized form of real estate such as units of REIT Funds Real Estate Investment Trust) that are growing popular in Indian financial markets.
2. Art and Collections such as antique cars, coins and paintings etc.
3. **Machineries and Equipments:** One can always invest in machines for usage in business as well as leasing them out to generate regular income. Aircrafts and ships are such examples.
4. Live Stock such as farm animals and poultry units.

Like any other investments, one can invest in real assets indirectly using PIVs. Real assets are generally not linked to overall economy, hence are lowly correlated with other financial assets. It makes them a viable choice for additional diversification.

Contractual and Intangible Assets

A contract to buy or sell a particular asset on a future date at a predetermined price itself is an investment. Just wonder that you commit a client, you will sell her 1000 share of Reliance Industries Ltd (RIL) after one month at a price of ₹ 920 per share. When you entered in this contract, RIL was quoting at ₹ 915 and you didn't own those stocks on the date of contract. At this point of time you are in a better position. If price of Reliance stock moved below ₹ 920 one month hence you gain and when it edged up past 920 you lose. The counter party's position is just the opposite of yours. This type of contracts is popularly known as a derivative contract. There are options, futures, forwards and swaps in derivative segment with many combinations of basics.

Intangibles, on the other hand, are investment options such as patents, R and D, goodwill, franchise, copyrights, trademarks and brands. These assets are in fact 'intellectual property' fetching a stream of returns for a long period of time.

Currencies

Last but not the least, holding the currency of foreign nations is very much an investment. With full currency convertibility policy followed any one can hold any currency in bank

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Return: Rate of return could be defined as the total income the investor receives during the holding period stated as a percentage of the purchasing price at the beginning of the holding period

deposits or in hand or in foreign currency designated assets. If those currencies appreciate against the domestic currency, the holder of foreign currency gains a lot and the holder may lose if the foreign currency depreciates against the domestic currency. India has a foreign currency reserve of close to 300 billion US Dollar and China holds foreign exchange reserves of approximately 3300 billion USD as on March 2013. These foreign exchange holdings are investment in currencies.

1.2.3 Goals of Investment

The main investment objectives are increasing the rate of return and reducing the risk. Other objectives like safety, liquidity tax benefit and hedge against inflation can be considered as subsidiary objectives.

Maximizing Return

Investors always expect a good rate of return from their investments. Rate of return could be defined as the total income the investor receives during the holding period stated as a percentage of the purchasing price at the beginning of the holding period.

$$\text{Return} = \frac{\text{End period value} - \text{Beginning period value} + \text{Dividend}}{\text{Beginning period value}} \times 100$$

Rate of return is stated semi-annually or annually to help comparison among the different investment alternatives. If it is a stock, the investor gets the dividend as well as the capital appreciation as returns. Market return of the stock indicates the price appreciation for the particular stock. If a particular share is purchased in 1998 at ₹ 50, disposed at ₹ 60 in 1999 and the dividend yield is ₹ 5, then the return would be calculated as follows.

$$\text{Return} = \frac{\text{Capital appreciation \& dividend}}{\text{Purchase price}} \times 100$$

$$\text{Return} = \frac{10+5}{50} \times 100 = 30\%$$

Minimizing Risk

Risk of holding securities is related with the probability of actual return becoming less than the expected return. The word risk is synonymous with the phrase variability of return. Investments' risk is just as important as measuring its expected rate of return because minimising risk and maximising the rate of return are interrelated objectives in the investment management. An investment whose rate of return varies widely from period to period is risky than whose return that does not change much. Every investor likes to reduce the risk of his investment by proper combination of different securities.

Maximizing Liquidity

Marketability of the investment provides liquidity to the investment. The liquidity depends upon the marketing and trading facility. If a portion of the investment could be converted into cash without much loss of time, it would help the investor meet the emergencies. Stocks are liquid only if they command good market by providing adequate return through dividends and capital appreciation.

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Maximizing Hedge against inflation

Since there is inflation in almost all the economy, the rate of return should ensure a cover against the inflation. The return rate should be higher than the rate of inflation, otherwise the investor will have loss in real terms. Growth stocks would appreciate in their values overtime and provide a protection against inflation. The return thus earned should assure the safety of the principal amount, regular flow of income and be a hedge against inflation.

Maximizing Safety and Security

The selected investment avenue should be under the legal and regulatory frame work. If it is not under the legal frame work, it is difficult to represent the grievances, if any. Approval of the law itself adds a flavour of safety. Even though approved by law, the safety of the principal differs from one mode of investment to another. Investments done with the government assure more safety than with the private party. From the safety point of view investments can be ranked as follows: bank deposits, government bonds, UTI units, non-convertible debentures, convertible debentures, equity shares, and deposits with the non-banking financial companies.

Maximizing Tax Benefit

There are investments that give tax benefits. Investment in housing, government savings plans, even bank deposits of duration exceeding a year, life insurance schemes, etc., give tax benefits.

1.3 TYPES OF INVESTMENT

Investments can be classified in many ways. We try to classify investments as, Financial Investments, Real Investments, Business Investments, Personal Investments and Institutional Investments. These are explained below.

1.3.1 Financial Investments

Financial Investments are investments in *financial assets which have claim on real assets or the income generated by them.* Financial Investments are also referred to as financial securities, investment vehicles or investment avenues. *Shares, bonds, mutual funds, insurance policies, provident funds, bank deposits*, etc., are instruments of financial investment. There is no entrepreneurial involvement here. *The return from the investment takes the form interest or dividend and/or capital appreciation.* Our course is concerned with financial investments. There are different instruments of financial investments. These can be classified in different ways. The classification can be on the basis of the *kind of return* or on the basis of *risk* or on the basis of the *market related* to or on the basis of *ownership* or on the basis of *primitiveness* or on some other basis.

(i) **On the basis of the kind of return:** Return on financial investments could be *fixed or varying*. Accordingly we have *fixed income investments on which the investor gets fixed stream of income periodically or the stream of income is computed according to a fixed formula.* The examples of fixed income securities are treasury bills, certificates of deposits, treasury bonds, bonds of

Check Your Progress

1. Define investments.
2. List the qualities that are essential for a commitment to be known as a 'secure investment'.
3. What are the main objectives of investments?
4. Name the categories into which investments can be classified.
5. What are preferred stocks?
6. What are pooled investment vehicles (PIVs)?

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federal agencies, state and local municipalities, corporations, etc. *Varying income investments give income that varies from period to period.* Examples are investment in equity shares, mutual funds, insurance policies, derivatives, etc.

(ii) **On the basis of the risk:** *Nil/Very low risk* investments (bank deposits, federal or government agency bonds, AAA rated bonds), *low risk* investments (commercial papers, mutual funds, AA and A rated bonds, etc.), *moderate risk* investments (equity shares of well established shares, BBB and BB rated bonds, derivatives, etc.) and high risk investments ('junk bonds', equity shares of start-up companies, etc.).

(iii) **On the basis of the market related to:** Investments could be classified into (i) Money market & capital market investments, (ii) Home market & global market investments, (iii) Primary market & secondary market investments, (iv) Equity & debt market investments.

(iv) **On the basis of ownership:** Investments could *equity* (that is ownership securities) investment or *debt* investment. Equity investment is in equity shares. *Preference shares* have the features both *debt and equity investments*. The rest are all debt investments (bank deposits, all bonds, commercial papers, etc.)

(v) **On the basis of primitiveness:** Investments could be primitive or derived. Shares, bonds, deposits, bullion, etc., are primitive. Derived investments are derived from primitive investments. Options, futures, convertibles, warrants, swaps and combinations of these are all derivatives.

1.3.2 Real Investments

Real Investments are investments in *real assets, which produce goods and services.* Real assets are tangible or intellectual assets from which revenues get generated. Tangible assets are real estates, businesses, industries, projects, bullion (like gold, silver, precious metals and stones), etc. Intellectual assets are Property Rights (like, Copy rights, Product or Process Patents, etc), Consultancy services, etc. The revenue from real investments will be in the form of sales income, service income or fee income. From the revenue if you subtract expenses in earning the reported revenue you get net profit or net loss. Real investments invariably involve entrepreneurial pursuits and day-to-day management of the affairs of the enterprise. *The return from the real investments is in the form of profit, wealth creation, royalty, fees and the like.*

1.3.3 Business Investments

Investment can also take the form of a business venture like mining, manufacturing, generation, fabrication, service, trade, wholesale, retail, infrastructure project, etc., where money is committed fairly for long period of time. This form of investment is by far the largest type of investments. The investors include Governments, Multi-national and domestic companies/firms, small business firms and individuals. These investments are riskier because the uncertainty and competition are more. These investments generate sales income from which profit or accretion to wealth or both might result as return on the investments. It must be noted that financial investment avenues are created by business investments because it is the business firms that float shares, stocks, bonds, commercial papers, certificates of deposits, etc for raising funds for investment in the business ventures and projects giving opportunity for investments in these financial

securities by others like individuals, mutual funds, institutional investors, banks, governments and even business firms. Business investments are the mother of all investments. Yes. There is no second thought on this.

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1.3.4 Personal Investments

Personal investment is investment by individuals out of their personal finance. Though individuals are ultimately the brains and hands behind investments, all investments don't qualify to be called as personal investment. Personal investment is investment by individual or on his/her behalf, for the individual and of the individual. Thus it is an important component of personal finance. It covers efforts often focused on creating a secure financial cushion for use in future for the individual or his/her heirs. Personal investments may be done in Certificates of Deposit (CD), savings accounts, pension plans, provident funds, insurance policies, company stocks, government and private sector bonds, investment in precious metals and stones, mutual funds, derivative securities, real estates, currencies, and other avenues that go to benefit the individual concerned with periodic and/or one-time return/wealth addition. Many of us opt to create a personal investment portfolio that consists of many different investment vehicles/ plans/ securities/ avenues. Personal investments are retail investments being investments in investment securities (buying and selling of investment securities) for and in their personal accounts, and not for any company or organization.

1.3.5 Institutional Investments

Institutional investments are investments by institutions as opposed to individual. Institutional investors are of different shade like banks, hedge funds, mutual funds, insurance companies, chit funds, provident funds, pension funds, retirement funds, domestic/foreign investment bankers and so on. These investors invest make large scale investments. Of course they mobilize small amounts of savings from numerous retail or individual investors and then the pooled large sum of money are invested in stock market, corporate through private placement issues, overseas capital market and the like. The types of investment depend on the type of the pooled funds and the investment horizon, risk preference and opportunity available. Investment institutions might also include manufacturing/ trading/ service sector companies which invest parts of their profits/surplus liquidity in choice investment avenues. Institutional investors are professional investment concerns and function as highly specialized investors on behalf of others, transferring fortunes earned out of their knowledge and wisdom to small investors or their stakeholders.

1.4 COMPARISON OF INVESTMENTS, SPECULATION AND GAMBLING

To the economist, investment is the net addition made to the nation's capital stock that consists of goods and services that are used in the production process. A net addition to the capital stock means an increase in the buildings, equipments or inventories. These capital stocks are used to produce other goods and services.

Financial investment is the allocation of money to assets that are expected to yield some gain over a period of time. It is an exchange of financial claims such as



Financial investment: Financial investment is the allocation of money to assets that are expected to yield some gain over a period of time

stocks and bonds for money. They are expected to yield returns and experience capital growth over the years.

The financial and economic meanings are related to each other because the savings of the individual flow into the capital market as financial investments, to be used in economic investment. Even though they are related to each other, we are concerned only about the financial investment made on securities.

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Speculation: Speculation means taking up the business risk in the hope of getting short term gain

Speculation

Speculation means taking up the business risk in the hope of getting short term gain. Speculation essentially involves buying and selling activities with the expectation of getting profit from the price fluctuations. This can be explained with an example. If a spouse buys a stock for its dividend, she may be termed as an investor. If she buys with the anticipation of price rise in the near future and the hope of selling it at a gain price she would be termed as a speculator. The dividing line between speculation and investment is very thin because people buy stocks for dividends and capital appreciation.

The time factor involved in the speculation and investment is different. The investor is interested in consistent good rate of return for a longer period. He is primarily concerned with the direct benefits provided by the securities in the long run. The speculator is interested in getting abnormal return i.e. extremely high rate of return than the normal return in the short run. Speculator's investments are made for short term.

The speculator is more interested in the market action and its price movement. The investor constantly evaluates the worth of security whereas the speculator evaluates the price movement. He is not worried about the fundamental factors like his counterpart, the investor.

The investor would try to match the risk and return. The speculator would like to assume greater risk than the investors. Risk refers to the possibility of incurring loss in a financial transaction. The negative short term fluctuations affect the speculators in a worse manner than the investors. The risk factor involved in the investment is also limited. After studying the factors related with the concerned company's stock, the investor buys it and hence the risk exposure is limited. The investor likes to invest in securities where his principal would be safe.

Table 1.9 *The Difference Between the Investor and the Speculator*

	Investor	*Speculator*	*Gambling*
Time horizon	Plans for a longer time horizon. His holding period may be from one year to few years.	Plans for a very short period. Holding period varies from few days to months.	Very, very short period.
Risk	Assumes moderate risk.	Willing to undertake high risk.	Maximum risk involved. Win or lose propositions.
Return	Likes to have moderate rate of return associated with limited risk.	Like to have high returns for assuming high risk	100% return to 100% loss.
Decision	Considers fundamental factors and evaluates the performance of the company regularly.	Considers inside information, heresays and market behaviour.	Instinct. Rocklessness. Hunch
Funds	Uses his own funds and avoids borrowed funds.	Uses borrowed funds to supplement his personal resources.	Who knows? May use own as well as borrowed funds.

Gambling and Investment

A gamble is usually a very short term investment in a game or chance. Gambling is different from speculation and investment. The time horizon involved in gambling is shorter than speculation and investment. The results are determined by the roll of dice or the turn of a card. Secondly, people gamble as a way to entertain themselves, earning incomes would be the secondary factor. Thirdly, the risk in gambling is different from the risk of the investment. Gambling employs artificial risks whereas commercial risks are present in the investment activity. There is no risk and return trade off in the gambling and the negative outcomes are expected. But in the investment there is an analysis of risk and return. Positive returns are expected by the investors. Finally, the financial analysis does not reduce the risk proportion involved in the gambling.

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1.5 HEDGING

Hedging is undertaken to reduce the price risk of a cash or forward position. The managerial goals of a hedging programme are to make a hedging decision and to manage the programme. Although closed related to asset/liability management and often used in conjuction with asset/liability management hedging is a distinct activity. A ***hedge*** is a position that is taken as a *temporary substitute* for a later position in another asset (or liability) or to protect the value of an existing position in an asset (or liability) until the position can be liquidated. In keeping with accepted terminology, we will describe the position that the firm seeks to hedge, whether it be on the asset side of the balance sheet or on the liabilities side of the balance sheet, as the *cash position.*



Hedge: A hedge is a position that is taken as a temporary substitute for a later position in another asset (or liability) or to protect the value of an existing position in an asset (or liability) until the position can be liquidated. In keeping with accepted terminology

Most hedging is done in derivative instruments. The instruments most often used for hedging are futures, forwards, options, and swaps. Futures, forwards, and swaps are off-balance sheet instruments. That is, they do not show up on either the assets side or on the liabilities side of the user's balance sheet. While most hedging is done in off-balance sheet instruments, it is important to note that a hedge can take the form of an on-balance sheet position. This is the case for example, when swap dealers hedge their swap portfolios in Treasury bonds and bills. The key, in this case, is the *temporary* nature of the cash market hedge.

1.5.1 The Objectives and Benefits of Hedging

In contrast to speculation, hedging is done to reduce risk. But is this desirable? If everyone hedged, would we not simply end up with an economy in which no one takes risks? This would surely lead to economic stagnancy. Moreover, we must wonder whether hedging can actually increase shareholder wealth.

If the famous Modigliani-Miller propositions are correct, then the value of the firm is independent of any financial decisions, which include hedging. Hedging, however, may be desired by the shareholders simply to find a more acceptable combination of return and risk. It can be argued, however, that firms need not hedge since shareholders, if they wanted hedging, could do it themselves. But this ignores several important points. It assumes that shareholders can correctly assess all the firm's hedgeable risks. If a company is exposed to the risk associated with volatile raw materials prices, can the shareholders properly determine the degree of risk? Can they determine the periods over which that risk is greatest? Can they determine the correct number of futures

Check Your Progress

7. What does speculation involve?
8. How is gambling different from speculation and investment?

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contracts necessary to hedge their share of the total risk? Do they even qualify to open a futures brokerage account? Will their transaction costs be equal to or less than their proportional share of the transaction costs incurred if the firm did the hedging? The answer to each these questions is "maybe not." It should be obvious that hedging is not something that shareholders can always do as effectively as firms.

In addition, there may be other reasons why firms hedge, such as tax advantages Low-income firms, for example those that are below the highest corporate tax rat particularly benefit from the interaction being also reduces the probability of bankruptev This is not necessarily valuable to the shareholders except that it can reduce the expected costs that are incurred if the firm does go bankrupt. Finally, a firm may choose hedge because its managers' livelihoods may be heavily tied to the performance of the firm The managers may then benefit from reducing the firm's risk. This may not be in the shareholders' best interest, but it can at least explain why some firms hedge. Final hedging may send a signal to potential creditors that the firm is making a concerted effort to protect the value of the underlying assets. This can result in more favoourable credit terms and less costly; restrictive covenants.

Many firms, such as financial institutions, are constantly trading over-the-counnter financial products like swaps and forwards on behalf of their clients. They offer these services to help their clients manage their risks. These financial institutions then turn around and hedge the risk they have assumed on behalf of their clients. How do they make money? They quote rates and prices to their clients that reflect a spread sufficient to cover their hedging costs and include a profit. In this manner, they become retailers of hedging services.

Hedging benefits society as well as the individual hedger. The ability to transfer risk allows the commodity hedger a more stable estimate of the cost of a product, which translates into a lower and more stable price for the product. Also, users of commodities are able to "lock-in" the future purchase price of the item they need with only a small cash margin "down payment," thereby allowing a reduction in current inventory. This reduction in inventory reduces the cost of business and improves the firm's liquidity, benefits that can be passed on to the consumer. The existence of financial futures allows pension funds to stabilise returns and reduce risk for the pension fund participants, enables financial institutions to reduce risk, and provides the means to create new products in the insurance, loan and investment arenas.

Hedging also is a tool used to offset the market *(systematic)* risk of stock portfolios. Previously, risk management for common stocks concentrated on diversification to eliminate *unsystematic* risk, but until futures and options contracts on stock index futures came into existence there was no effective means for eliminating most of the systematic risk of a stock portfolio. Alternatively, futures are used to adjust the beta of the stock portfolio to the desired value.

Finally, hedging is extremely important for the proper functioning, long-term liquidity, and open interest of a futures market. Thus, viable futures contracts are linked to commercial hedging activity. Although speculative interest provides shorter-term volume, speculative activity can be wagering and uncertain, especially since many speculators hold a position for only several weeks. Market makers on the futures floor provide intraday liquidity, but without speculators and hedgers the market makers soon depart to another pit. Likewise, arbitrageurs provide only limited liquidity for the

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markets. Hedgers are the key to the market, as is evident when a futures contract stops trading because of a lack of trading volume.

1.5.2 The Hedging Process

Hedging is to take a position in futures that "offsets" the price change in the cash asset. Hence, hedging a current long cash position consists of taking a short futures position. In order to determine whether one should sell or buy futures to initiate a hedge, a potential hedger can follow a two-step process:

1. Determine the exposure of the cash position to potential losses; that is, in what direction must cash prices change in order to create a loss? Thus, a loss occurs for a current long cash position when prices decline, whereas a loss occurs for a short cash or an *anticipated* cash position when prices increase.
2. Determine whether a short or a long futures position is needed to offset the potential loss in the cash position.

Before we can understand why a certain hedge is placed or how it works, we must become acquainted with a few basic hedging concepts.

1.5.3 Short Hedge and Long Hedge

The terms *short hedge* and *long hedge* distinguish hedges that involve short and long positions in the futures contract, respectively. A hedger who holds the commodity and is concerned about a decrease in its price might consider hedging it with a short position in futures. If the spot price and futures price move together, the hedge will reduce some of the risk. For example, if the spot price decreases, the futures price also will decrease. Since the hedger is short the futures contract, the futures transaction produces a profit that at least partially offsets the loss on the spot position. This is called a *short hedge* because the hedger is short futures.

Another type of short hedge can be used in anticipation of the future sale of an asset. An example of this occurs when a firm decides that it will need to borrow money at a later date. Borrowing money is equivalent to issuing or selling a bond or promissory note. If interest rates increase before the money is borrowed, the loan will be more expensive. A similar risk exists if a firm has issued a floating rate liability. Since the rate is periodically reset, the firm has contracted for a series of future loans at unknown rates. To hedge this risk, the firm might short an interest rate futures contract. If rates increase, the futures transaction will generate a profit that will at last partially offset the higher interest rate on the loan. Because it is taken out in anticipation of a future transaction in the spot market, this type of hedge is known as an *anticipatory hedge.*

Another type of anticipatory hedge involves an individual who plans to purchase a commodity at a later date. Fearing an increase in the commodity's price, the investor might buy a futures contract. Then, if the price of the commodity increases, the futures price also will increase and produce a profit on the futures position. That profit will at least partially offset the higher cost of purchasing the commodity. This is a long hedge, because the hedger is long in the futures market.

Another type of long hedge might be placed when one is short an asset. Although this hedge is less common, it would be appropriate for someone who has sold short a stock and is concerned that the market will go up. Rather than close out the short

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position, one might buy a futures and earn a profit on the long position in futures that will at least partially offset the loss on the short position in the stock.

In each of these cases, the hedger held a position in the spot market that was subject to risk. The futures transaction served as a temporary substitute for a spot transaction. Thus, when one holds the spot commodity and is concerned about a price decrease but does not want to sell it, one can execute a short futures trade. Selling the futures contract would substitute for selling the commodity. Table 1.10 summarises these various hedging situations.

1.5.4 Contract Choice

The choice of futures contract actually consists of three decisions: (1) which function commodity, (2) which expiration month and (3) whether to be long or short.

Table 1.10 *Hedging Situations*

Condition Today	*Risk*	*Appropriate Hedge*
Hold asset	Asset price may fall	Short hedge
Plan to buy asset	Asset price may rise	Long hedge
Sold short asset	Asset price may rise	Long hedge
Issued floating-rate liability	Interest rates may rise	Short hedge
Plan to issue liability	Interest rates may rise	Short hedge

Note: Short hedge means long spot, short futures; long hedge means short spot, long futures

Which futures commodity?

It is important to select a. futures contract on a commodity that is highly . correlated with the underlying commodity being hedged. In many cases the choice is obvious, but in some it is not. For example, suppose one wishes to hedge the rate on bank CDs, which are short-term money market instruments issued by commercial banks. There is no bank CD futures contract so the hedger must choose from among some other similar contracts. Liquidity is important, because the hedger must be able to close the contract easily. If the futures contract lacks the necessary liquidity, the hedger should select a contract that has sufficient liquidity and is highly correlated with the spot commodity being hedged Since both Treasury bills and Eurodollars are short-term money market instruments, their futures contracts, which are quite liquid, would seem appropriate for hedging bank CD rates. Of course, if the hedger wanted the hedging instrument to be identical to the underlying spot asset, he or she could go to the over-the-counter market and request a forward contract, but that would entail some other considerations.

Another factor one should consider is whether the contract is correctly priced. A short hedger will be selling futures contracts and therefore should look for contracts that are overpriced or, in the worst case, correctly priced. A long hedger should hedge by buying underpriced contracts or, in the worst case correctly priced contracts. Somethimes the best hedge can be obtained by using more than one futures commodity.

Which expiration month?

Once one has selected the futures commodity, one must decide on the expiration month. As we know, only certain expiration months trade at a given time. For example

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in September the Treasury bond futures contract has expirations of December of the current year, March, June, September, and December of the following year, and March, June, and September of the year after that. If the Treasury bond futures contract is the appropriate hedging vehicle, the contract used must come from this group of expirations.

In most cases there will be a time horizon over which the hedge remains in effect. To obtain the maximum reduction in basis risk, a hedger should hold the futures position until as close as possible to expiration. Thus, an appropriate contract expiration would be one that corresponded as closely as possible to the expiration date. However, the general rule of thumb is to avoid holding a futures position in the expiration month. This is because unusual price movements sometimes are observed in the expiration month, and this would pose an additional risk to hedgers. Thus, the hedger should choose an expiration month that is as close as possible to but after the month in which the hedge is terminated. However, this rule used not always be strictly followed since all contracts don't exhibit unusual price behaviour in the expiration month. Infact, the longer the tirne expiration, the less liquid is the contract. Therefore, the selection of a contract according to this criterion may need to be overruled by the necessity of using a liquid contract. If this happens, one should use a contract with a shorter expiration. When the contract moves into its expiration month, the futures position is closed out and a new position is opened in he next expiration month. This process, called *rolling the hedge forward* generates some additional risk but can still be quite effective.

Of course, the time horizon problem can be handled perfectly by using a forward contract from the over-the-counter market. In fact some hedgers have horizons of longer than 10 years, which can be hedged only by using forward contracts.

Long or short?

After selecting the future commodity and expiration month, the hedger must decide whether to be long or short. This decision is critical and there is absolutely no room for a mistake here. If a hedger goes long (or short) when he should have been short (or long), he has doubled the risk. The end result will be a gain or loss twice the amount of the gain or loss of the unhedged position.

The decision of whether to go long or short requires a determination of which type of market move will result in a loss in the spot market. It then requires establishing a futures position that will be profitable while the spot position is losing. Table 1.11 summarises three methods that will correctly identify the appropriate futures transaction. The first method requires that the hedger identify the worst case scenario and then establish a futures position that will profit if the worst case does occur. The second method requires taking a futures position that is opposite to the current spot position. This is a simple method, but in some cases it is difficult to identify the current spot position. The third method identifies the spot transaction that will be conducted when the hedge is terminated. The futures transaction that will be conducted when the hedge is terminated should be the opposite of this spot transaction. The futures transaction that should be done today should be the opposite of the futures transaction that should be done at the termination of the hedge.

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Table 1.11

Worst Case Scenario Method
1. Assuming that the spot and futures markets move together, determine whether long and short positions in futures would be profitable if the market goes up or down. 2. What is the worst that could happen in the sport market? a. The spot market goes up. b. The spot market goes down. 3. Given your answer in 2, assume that the worst that *can* happen *will* happen. 4. Given your answer in 3, and using your answer in 1, take a futures position that will be profitable.
Current Spot Position Method
1. Determine whether your current position in the spot market is long or short. a. If you own or plan to sell an asset, your current position is long. b. If you are short an asset, your current position is short. c. If you are committed to buying an asset in the future, your current position is short. d. If you have issued a floating rate liability, your current position is long. e. If you plan to issue a liability, your current position is long 2. Take a futures position that is opposite the position given by your answer in 1. Anticipated Future Spot Transaction Method 1. Determine what type of sot transaction you will be making when the hedge is terminated. a. Sell an asset. b. Buy an asset. c. Issue (sell) a liability (this includes a liability with a floating rate reset). 2. Given your answer in 1, you will need to terminate a futures position at the horizon date by doing the opposite transaction to the one in 1, e.g., if your answer in 1 is "sell," your answer here is "buy a futures." 3. Given your answer in 2, you will need to open a futures contract today by doing the opposite, e.g., if your answer in 2 is "buy a futures," your answer here should be "sell a futures."

1.6 CONCEPTS OF PORTFOLIO

A portfolio is a collection of investments. Don't put "all eggs" in one basket; put them in many baskets. Like that put your money in many investments. Do it systematically and prudently. That is portfolio route to investment. This can reduce risk. Investing together in securities such as stocks, bonds, and money market instruments in order to obtain an optimum return with minimum risk is called portfolio construction. Diversification of investments helps to spread risk over many assets. A diversification of securities gives the assurance of obtaining the anticipated return on the portfolio. In a diversified portfolio, some securities may not perform as expected, but others may exceed the expectation and make the actual return of the portfolio reasonably close to the anticipated one. Keeping a portfolio of a single security may lead to a greater likelihood of the actual return being somewhat different from that of the expected return. Hence, it is a common practice to diversify securities in the portfolio.

Check Your Progress

9. How does hedging benefit hedgers?
10. List the decisions that determine the choice of a futures contract.

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1.6.1 Approaches in Portfolio Construction

Commonly, there are two approaches in the construction of the portfolio of securities, viz, traditional approach and Markowitz efficient frontier approach. In the traditional approach, investor's needs in terms of income and capital appreciation are evaluated and appropriate securities are selected to meet the needs of the investor. The common practice in the traditional approach is to evaluate the entire financial plan of the individual. In the modern approach, portfolios are constructed to maximize the expected return for a given level of risk. It views portfolio construction in terms of the expected return and the risk associated with obtaining the expected return.

1. Traditional approach

The traditional approach basically deals with two major decisions. They are:

(a) Determining the objectives of the portfolio

(b) Selecting securities to be included in the portfolio

Normally, this is carried out in four to six steps. Before formulating the objectives, the constraints of the investor should be analysed. Within the given framework of constraints, objectives are formulated. Then based on the objectives, securities are selected. After that, the risk and return of the securities should be studied. The investor has to assess the major risk categories that he or she is trying to minimise. Compromise on risk and non-risk factors has to be carried out. Finally, relative portfolio weights are assigned to securities like bonds, stocks and debentures and then diversification is carried out. The flow chart given in Figure 1.11 explains this.

Analysis of constraints

The constraints normally discussed are: income needs, liquidity, time horizon, safety, tax considerations and the temperament.

Income needs

The income needs depend on the need for an income in constant rupees and current rupees. The need for income in current rupees arises from the investor's need to meet all or part of the living expenses. At the same time inflation may erode the purchasing power, the investor may like to offset the effect of the inflation and so, needs income in constant rupees.

(a) **Need for current income:** The investor should establish the income which the portfolio should generate. The current income need depends upon the entire current financial plan of the investor. The expenditure required to maintain a certain level of standard of living and all the other income generating sources should be determined. Once this information is arrived at, it is possible to decide how much income must be provided for the portfolio of securities.

(b) **Need for constant income:** Inflation reduces the purchasing power of the money. Hence, the investor estimates the impact of inflation on his estimated stream of income and tries to build a portfolio which could offset the effect of inflation. Funds should be invested in such securities where income from them might increase at a rate that would offset the effect of inflation. The inflation or

purchasing power risk must be recognized but this does not pose a serious constraint on portfolio if growth stocks are selected.

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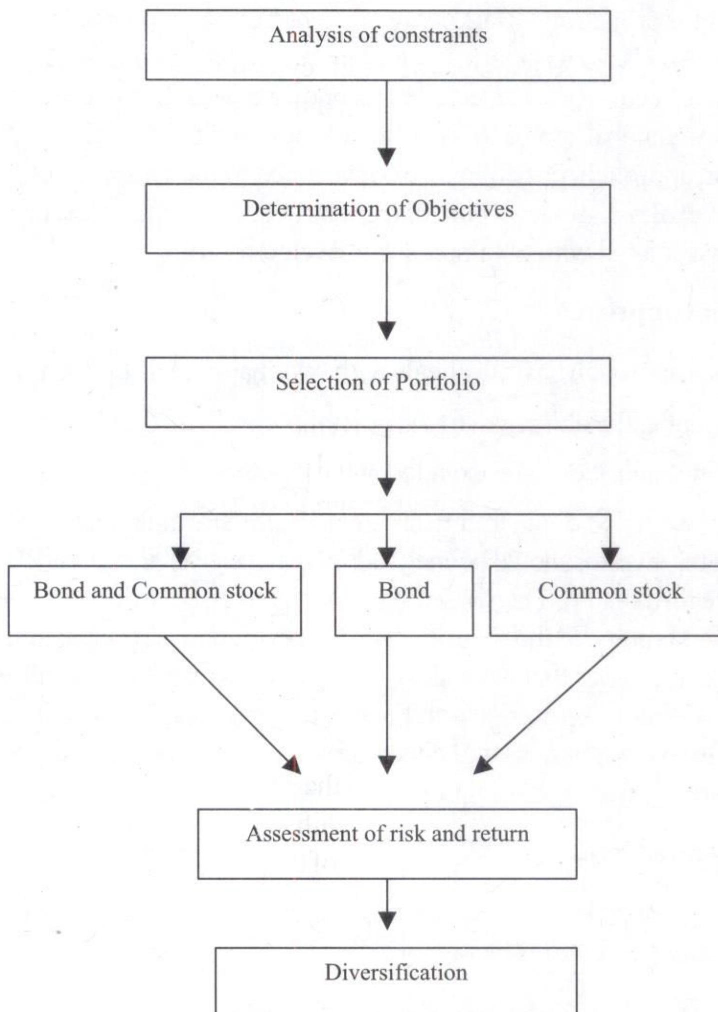


Fig. 1.11 Steps in Traditional Approach

Liquidity

Liquidity need of the investment is highly individualistic of the investor. If the investor prefers to have high liquidity, then funds should be invested in high quality short-term debt maturity issues such as money market funds, commercial papers and shares that are widely traded. Keeping the funds in shares that are poorly traded or stocks in closely held business and real estate lack liquidity. The investor should plan his cash drain and the need for net cash inflows during the investment period.

Safety of the principal

Another serious constraint to be considered by the investor is the safety of the principal value at the time of liquidation. Investing in bonds and debentures is safer than investing in the stocks. Even among the stocks, the money should be invested in regularly traded companies of longstanding. Investing money in the unregistered finance companies may not provide adequate safety.

Time horizon

Time horizon is the investment-planning period of the individuals. This varies from individual to individual. Individual's risk and return preferences are often described in terms of his "life cycle". The stages of the life cycle determine the nature of investment. The first stage is the early career situation. At the career starting point, assets are lesser than their liabilities. More goods are purchased on credit. His house might have been built with the help of housing loan scheme. His major asset may be the house he owns. His priority towards investments may be in the form of savings for liquidity purposes. He takes life insurance for protecting him from unforeseen events like death and accidents and then he thinks of the investments. The investor is young at this stage and has long horizon of life expectancy with possibilities of growth in income, he can invest in high-risk and growth oriented investments.

The other stage of the time horizon is the mid-career individual. At this stage, his assets are larger than his liabilities. Potential pension benefits are available to him. By this time he establishes his investment program. The time horizon before him is not as long as the earlier stage and he wants to protect his capital investment. He may wish to reduce the overall risk exposure of the portfolio but, he may continue to invest in high risk and high return securities.

The final stage is the late career or the retirement stage. Here, the time horizon of the investment is very much limited. He needs stable income and once he retires, the size of income he needs from investment also increases. In this stage, most of his loans are repaid by him and his assets far exceed the liabilities. His pension and life insurance programmes are completed by him. He shifts his investment to low return and low risk category investments, because safety of the principal is given priority. Mostly he likes to have lower risk with high interest or dividend paying component to be included in his portfolio. Thus, the time horizon puts restrictions on the investment decisions.

Tax consideration

Investors in the income tax paying group consider the tax concessions they could get from their investments. For all practical purpose, they would like to reduce the taxes. For income tax purpose, interests and dividends are taxed under the head 'income from other sources'. The capital appreciation is taxed under the head 'capital gains' only when the investor sells the securities and realises the gain. The tax is then at a concessional rate depending on the period for which the asset has been held before being sold. From the tax point of view, the form in which the income is received, i.e., interest, dividend, short-term capital gains and long term capital gains are important. If the investor cannot avoid taxes, he can delay the taxes. Investing in government bonds and NSC can avoid taxation. This constraint makes the investor to include the items which will reduce the tax.

Temperament

The temperament of the investor himself poses a constraint on framing his investment objectives. Some investors are risk lovers or takers who would like to take up higher risk even for low return. While some investors are risk averse, who may not be willing to undertake higher level of risk even for higher level of return. The risk neutral investors match the return and the risk. For **example**, if a stock is highly volatile in nature then

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Time horizon: Time horizon is the investment-planning period of the individuals.

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the stock may be selling in a range of ₹ 100 – 200, and returns may fluctuate between ₹ 100 – 100 in a year. Investors who are risk averse would find it disturbing and do not have the temperament to invest in this stock. Hence, the temperament of the investor plays an important role in setting the objectives.

2. Modern Approach

The traditional approach is a comprehensive financial plan for the individual. It takes into account the individual needs such as housing, life insurance and pension plans. But these types of financial planning approaches are not done in the Markowitz approach. Markowitz gives more attention to the process of selecting the portfolio. His planning can be applied more in the selection of common stocks portfolio than the bond portfolio. The stocks are not selected on the basis of need for income or appreciation. But the selection is based on the risk and return analysis. Return includes the market return and dividend. The investor needs return and it may be either in the form of market return or dividend. They are assumed to be indifferent towards the form of return.

From the list of stocks quoted at the Bombay Stock Exchange or at any other regional stock exchange, the investor selects roughly some group of shares say of 10 to 15 stocks. For these stocks' expected return and risk would be calculated. The investor is assumed to have the objective of maximising the expected return and minimising the risk. Further, it is assumed that investors would take up risk in a situation when adequately rewarded for it. This implies that individuals would prefer the portfolio of highest expected return for a given level of risk.

In the modern approach, the final step is asset allocation process that is to choose the portfolio that meets the requirement of the investor. The risk taker, i.e., who is willing to accept a higher probability of risk for getting the expected return would choose high risk portfolio. Investor with lower tolerance for risk would choose low-level risk portfolio. The risk neutral investor would choose the medium-level risk portfolio.

1.7 PORTFOLIO MANAGEMENT

After establishing the asset allocation, the investor has to decide how to manage the portfolio over time. He can adopt passive approach or active approach towards the management of the portfolio. In the passive approach, the investor would maintain the percentage allocation for asset classes and keep the security holdings within its place over the established holding period. In the active approach the investor continuously assess the risk and return of the securities within the asset classes and changes them accordingly. He would be studying the risks (1) market related, (2) group related and (3) security specific and changes the components of the portfolio to suit his objectives.

1.7.1 Determination of Goals and Selection of Portfolios

Portfolios have the common goals of financing present and future expenditures from a large pool of assets. The return that the investor requires and the degree of risk he is willing to take depend upon the constraints. The goals of portfolio range from income to capital appreciation. The common goals are stated as:

Check Your Progress

11. How is the diversification of investments beneficial?
12. Name the two approaches to the construction of a portfolio of securities.

- Current income
- Growth in income
- Capital appreciation
- Preservation of capital

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The investor in general would like to achieve all the four objectives, nobody would like to lose his investment. But, it is not possible to achieve all the four objectives simultaneously. If the investor aims at capital appreciation, he should include risky securities where there is an equal likelihood of losing the capital. Thus, there is a conflict among the objectives.

Selection of portfolio

The selection of portfolio depends on the various goals of the investor. The selection of portfolio under different goals are dealt subsequently.

Objectives and asset mix

If the main objective is getting adequate amount of current income, sixty per cent of the investment is made on debts and 40 per cent on equities. The proportions of investments on debt and equity differ according to the individual's preferences. Money is invested in short-term debt and fixed income securities. Here the growth of income becomes the secondary objective and stability of principal amount may become the third. Even within the debt portfolio, the funds invested in short-term bonds depends on the need for stability of principal amount in comparison with the stability of income. If the appreciation of capital is given third priority, instead of short-term debt the investor opts for long term debt. The maturity period may not be a constraint.

Growth of income and asset mix

Here the investor requires a certain percentage of growth in the income received from his investment. The investor's portfolio may consist of 60 to 100 per cent equities and 0 to 40 per cent debt instrument. The debt portion of the portfolio may consist of concession regarding tax exemption. Appreciation of principal amount is given third priority. For **example**, computer software, hardware and non-conventional energy producing company shares provide good possibility of growth in dividend.



Capital appreciation: Capital appreciation means that the value of the original investment increases over the years

Capital appreciation and asset mix

Capital appreciation means that the value of the original investment increases over the years. Investment in real estates like land and house may provide a faster rate of capital appreciation but they lack liquidity. In the capital market, the values of the shares are much higher than their original issue prices. For example, Satyam Computers, share value was ₹ 306 in April 1998 but in October 1999 the value was ₹ 1658. Likewise, several examples can be cited. The market capitalisation also has increased. Next to real assets, the stock markets provide best opportunity for capital appreciation. If the investor's objective is capital appreciation, 90 to 100 per cent of his portfolio may consist of equities and 0-10 per cent of debts. The growth of income becomes the secondary objective.

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Safety of principal and asset mix

Usually, the risk-averse investors are very particular about the stability of principal. According to the life cycle theory, people in the third stage of life also give more importance to the safety of the principal. All the investors have this objective in their mind. No one like to lose his money invested in different assets. But, the degree may differ. The investor's portfolio may consist more of debt instruments and within the debt portfolio more would be on short-term debts.

1.7.2 Risk and Return Trade Off

The basic trade off in the investment process is between the anticipated rate of return for a given investment instrument and its degree of risk. The traditional approach to portfolio building has some basic assumptions. First, the individual prefers larger to smaller returns from securities. To achieve this goal, the investor has to take more risk. The ability to achieve higher returns is dependent upon his ability to judge risk and his ability to take specific risks. The risks are namely interest rate risk, purchasing power risk, financial risk and market risk. The investor analyses the varying degrees of risk and constructs his portfolio. At first, he establishes the minimum income that he must have to avoid hardships under most adverse economic condition and then he decides risk of loss of income that can be tolerated. The investor makes a series of compromises on risk and non-risk factors like taxation and marketability after he has assessed the major risk categories, which he is trying to minimize.

Diversification

Once the asset mix is determined and the risk and return are analyzed, the final step is the diversification of portfolio. Financial risk can be minimized by commitments to top-quality bonds, but these securities offer poor resistance to inflation. Stocks provide better inflation protection than bonds but are more vulnerable to financial risks. Good quality convertibles may balance the financial risk and purchasing power risk. According to the investor's need for income and risk tolerance level portfolio is diversified. In the bond portfolio, the investor has to strike a balance between the short term and long term bonds. Short-term fixed income securities offer more risk to income and long term fixed income securities offer more risk to principal. In the stock portfolio, he has to adopt the following steps which are shown in Figure 1.12.

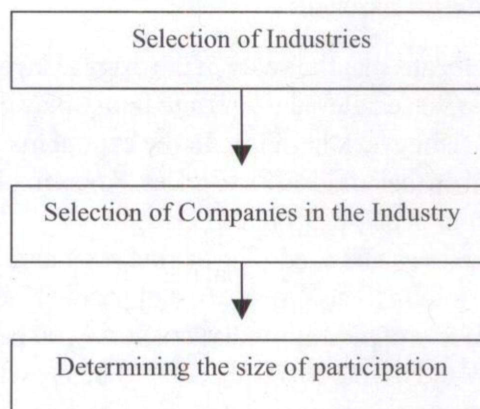


Fig. 1.12 *Diversification of Portfolio*

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The investor has to select the industries appropriate to his investment objectives. Each industry corresponds to specific goals of the investor. The sales of some industries like two wheelers and steel tend to move in tandem with the business cycle, the housing industry sales move. If regular income is the criterion then industries, which resist the trade cycle should be selected. Likewise, the investor has to select one or two companies from each industry. The selection of the company depends upon its growth, yield, expected earnings, past earnings, expected price earning ratio, dividend and the amount spent on research and development. Selecting the best company is widely followed by all the investors but this depends upon the investors' knowledge and perceptions regarding the company. The final step in this process is to determine the number of shares of each stock to be purchased. This involves determining the number of different stocks that is required to give adequate diversification. Depending upon the size of the portfolio, equal amount is allocated to each stock. The investor has to purchase round lots to avoid transaction costs.

1.8 FINANCIAL INVESTMENT AVENUES

In the past, investment avenues were limited to real assets, schemes of the post office and banks. At present, a wide variety of investment avenues are open to the investors to suit their needs and nature. A knowledge about the different avenues enables the investors to choose investment intelligently. The required level of return and the risk tolerance level decide the choice of the investor. The investment alternatives ranges from financial securities to traditional non-security investments. The financial securities may be negotiable or non-negotiable.

The negotiable securities are financial securities that are transferable. The negotiable securities may yield variable income or fixed income. Securities like equity shares are variable income securities. Bonds, debentures, Indra Vikas Patras, Kisan Vikas Patras, Government securities and money market securities yield a fixed income.

The non-negotiable financial investment as the name itself suggests is not transferable. This is also known as non-securitised financial investments. Deposit schemes offered by the post offices, banks, companies, and non-banking financial companies are of this category. The tax-sheltered schemes such as public provident fund, national savings certificate and national savings scheme are also non-securitised financial investments.

Mutual fund is another investment alternate. It is of recent origin in India. Within a short span of time several financial institutions and banks have floated varieties of mutual funds. The investors with limited funds can invest in the mutual funds and can have the benefits of the stock market and money market investments as specified by the particular fund.

The real assets always find a place in the portfolio. They are gold, silver, arts, property and antiques. These are non-financial investment.

Check Your Progress

13. What are the common goals of portfolios?
14. What is capital appreciation?

1.8.1 Varying Income Securities: Negotiable Securities

Equity shares: The equity shares attract the interest of many. In the early nineties, the stock market was the best and safest place for the common individual to invest. Since 1996 the share market prices have been low. This made the retail investors to turn

away from the stock market. The characteristic features of the equity are given in the previous chapter.

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Growth shares: The stocks that have higher rate of growth than the industrial growth rate in profitability are referred to as growth shares



Speculative shares: Shares that have lot of speculative trading in them are referred to as speculative shares

The stock market classifies shares into Growth shares, Income shares, Defensive shares, Cyclical shares and Speculative shares.

(i) **Growth shares:** The stocks that have higher rate of growth than the industrial growth rate in profitability are referred to as growth shares. For example, the list of major gainers for 1999 is dominated by software sector stocks. The HCL and Infosystems share prices increased sharply.

(ii) **Income shares:** These stocks belong to companies that have comparatively stable operations and limited growth opportunities. The bank shares and some of the fast moving consumer goods stocks such as Cadburys, Nestle and Hindustan Lever may be termed as income shares.

(iii) **Defensive shares:** Defensive stocks are relatively unaffected by the market movements. For example, a host of pharmaceutical stocks posted returns in excess of 50 per cent in 1998. The pharmaceutical industry owing to its inherent nature of demand is not affected by the down turn in the economy.

(iv) **Cyclical shares:** The business cycle affects the cyclical shares. The upward and downward movements of the business cycle affect the business prospects of certain companies and their stock prices. Such shares provide low to moderate current yield. Capital gain may be highly variable. For example, the automobile sector stocks are affected by the business cycles.

(v) **Speculative shares:** Shares that have lot of speculative trading in them are referred to as speculative shares. During the bull and bear phases of the market, this type of shares attracts the attention of the traders.

The stocks, which fall under one category in one period may switch over to another category in another period. The classification should not be considered rigid. For example, growth shares may be speculative shares.

1.8.2 Fixed Income Securities: Negotiable Securities

(a) *Preference shares:* Preference shares are no longer regarded as inferior to the equity capital. Corporate like Siemens has placed ₹ 150 Cr. worth of preference shares. High tax paying companies or investors prefer to subscribe to the preference shares and investors with a low tax burden would prefer to go in for debt instruments. The conversion options provided in the by preference shares also make it attractive. The biggest advantage is the tax-exempt status of the preference share's dividend.

(b) *Debentures:* Corporate debentures are an option available to the investors who are willing to sacrifice liquidity for higher return. Manufacturing companies like Gujarat Industries Power and TISCO have issued debentures. If the debentures are not actively traded in the debt segment of the capital market, the investors may have to hold the instrument till maturity. If the instruments were actively traded in the secondary market, it would have perhaps changed hands at a considerable premium, thereby lowering the yield on par with the present interest rate. These reasons contribute towards high coupon rates on debentures.

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(c) *Bonds:* Bonds are similar to the debentures but they are issued by the public sector undertakings. The value of the bond in the market depends upon the interest rate and the maturity. The coupon rate is the nominal interest rate offered on the bonds. The coupon rate is contractual involving the terms and conditions of the issuance of the debt security. Being contractual it cannot be changed during the tenure of the instrument. The investors are not affected by lowering of the bank rates. When the bank rates are lowered, actually, the value of the bonds, which are carrying interest rates above the bank rate would appreciate. IDBI and ICICI have issued various bonds to suit the needs of the investors. Some of them are deep discount bond, education benefit bond, retirement benefit bond and index bond.

(d) *IVPs and KVPs:* These are saving certificates issued by the post office with the name Indira Vikas Patra (IVP) and Kisan Vikas Patra (KVP). The IVPs are in the face value of ₹ 500, 1000 and 5000. The KVPs are in the denomination of ₹ 1000, 5000 and 10000. The capital is doubled in 5.5 years with the return of 13.47%. IVPs are like bearer bonds, transferable by hand delivery and therefore are attractive to the persons who prefer cash transactions. No income tax concession is available for this type of investment.

(e) *Government securities:* The securities issued by the Central, State Government and Quasi Government agencies are known as Government securities or gilt edged securities. As Government guaranteed security is a claim on the Government, it is a secured financial instrument, which guarantees the income and the capital. The rate of interest on these securities is relatively lower because of their high liquidity and safety.

(f) *Money market securities:* Money market securities have very short term maturity say less than a year. Common money market instruments are:

(i) **Treasury bills:** A treasury bill is basically an instrument of short term borrowing by the Government of India. To develop the treasury bill market and provide investors with financial instruments of varying short-term maturities and to facilitate the cash management requirements of various segments of the economy, in April 1997 treasury bills of varied maturities were introduced. 14-day treasury bill on a weekly basis was introduced from June 6, 1997. In the second half of 1997-98, treasury bill of 28-day was introduced on auction basis. Further, it was decided to reintroduce 182-day treasury bills through auctions. Generally, treasury bills are of 91-days. Since the interest rates offered on the treasury bills are very low, individuals very rarely invest in them.



Treasury bills: A treasury bill is basically an instrument of short term borrowing by the Government of India

(ii) ***Commercial papers:*** Commercial paper is a short-term negotiable instrument with fixed maturity period. It is an unsecured promissory note issued by the company either directly or through bank/merchant banks. The maturity period of commercial paper was originally three (minimum) to six (maximum) months from the date of issue. In Oct 1993, the maximum period was extended to one year. The commercial papers are sold at a discount and redeemed at their face value. The discounted value implicates the interest rate. The denomination of commercial paper is high. Mostly the companies and institutional investors favour them. The minimum maturity of CP was brought down from 3 months to 30 days.



Commercial papers: Commercial paper is a short-term negotiable instrument with fixed maturity period

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Certificate of deposit: The certificate of deposit is a marketable receipt of funds deposited in a bank for a fixed period at a specified rate of interest

(iii) ***Certificate of deposit:*** The certificate of deposit is a marketable receipt of funds deposited in a bank for a fixed period at a specified rate of interest. They are bearer documents and readily negotiable. The denominations of the CD and the interest rate on them are high. It is mainly preferred by institutional investors and companies rather than the individuals. The minimum size of the certificate is ₹ 10 lakh. The additional amount is issued in multiples of ₹ 5 lakh.

1.8.3 Non-Negotiable Securities

There are various types of non-negotiable securities.

1. Deposits

Deposits earn fixed rate of return. Even though bank deposits resemble fixed income securities they are not negotiable instruments. Some of the deposits are dealt subsequently.

(a) *Bank deposits:* It is the simple investment avenue open for the investors. He has to open an account and deposit the money. Traditionally the banks offered current account, savings account and fixed deposit account. Current account does not offer any interest rate. The drawback of having large amounts in savings accounts is that the return is just 4.5 per cent. The savings account interest rate is regulated by the Reserve Bank of India and kept low because of the high cost of servicing them. The savings account is more liquid and convenient to handle. The fixed account carries high interest rate and the money is locked up for a fixed period. With increasing competition among the banks, the banks have bundled the plain savings account with the fixed account to cater to the needs of the small savers. Some of the hybrid accounts are given in the Table 1.12.

Table 1.12 *Hybrid Accounts offered by some Banks*

Bank	*Product*	*Nature (₹)*	*Min.Dep*	*Other benefits*
ICICI Bank	Maxi cash	Savings account savings with Auto - sweep facility through which standing instructions can be issued to transfer surplus funds to FD.	5,000	ATM card, Internet banking and assistance in investing funds in money market instruments, anywhere banking and cheque book.
Quantum - Optima		FD linked to savings account with Auto-sweep, Reverse-sweep, facilities.	25,000	ATM card, Anywhere banking, Internet Banking, facility.
IndusInd Bank	2-in-1 Accounts	Savings account with link to FD.	25,000	Cheque book and overdraft facility.
	Cluster Deposits	Savings linked FD with Auto-sweep and Reverse-sweep	25,000	Cheque book.

Global Trust Bank	Maha Savings	Savings linked with FD Auto-sweep (in multiples of ₹.5,000) and Reverse-sweep	20,000	Cheque book and ATM card.
Flexi Unit		FD with linked savings account and Reverse-sweep (in multiples of ₹.1,000)	12,500	Cheque book and ATM card.
HDFC Bank	Super saver account	Savings linked to FD.	25,000	Overdraft, cheque book, ATM and phone banking.
	Sweep -in- account	Savings linked to FD with Reverse-Sweep and add-on deposit.	25,000	ATM, Cheque book and phone banking.

The deposits in the banks are considered to be safe because of the RBI regulation. The risk averse investors prefer the bank deposits.

(b) *Post office deposits:* Like the banks, post office also offers fixed deposit facility and monthly income scheme. Post office Monthly Income Scheme is a popular scheme for the retired. An interest rate of 13% is paid monthly. The term of the scheme is 6 years, at the end of which a bonus of 10% is paid. The annualised yield to maturity works out to be 15.01% per annum. After three years, premature closure is allowed without any penalty. If the closure is after one year, a penalty of 5% is charged.

(c) *NBFC deposits:* In recent years, there has been a significant increase in the importance of non-banking financial companies in the process of financial intermediation. The NBFC comes under the purview of the RBI. The amendment of RBI Act in Jan 1997, made registration compulsory for the NBFCs.

(i) *Period:* The maturity period ranges from few months to five years. It varies from company to company. For example, the Birla Global Finance, the company belonging to Aditya Birla group accepts deposits with maturity from 3-5 years.

(ii) *Maximum limit:* The limit for acceptance of deposit has been based on the credit rating of the company. The NBFCs' not having net owned funds of ₹ 25 lakh are not entitled to accept deposits.

(iii) *Interest:* NBFCs have been debarred from offering an interest rate exceeding 16 per cent per annum and a brokerage fee over 2 per cent on public deposit. The interest rate differs according to maturity period. There is a disparity in the interest rate among the companies in accordance with the credit ratings and policies of the companies. Even the companies with similar credit ratings provide different interest rates for their deposits. Generally, companies with lower credit ratings offer higher interest rates to cover the risk. The following Table 1.13 shows the interest rates offered by some of the finance companies as on Feb 1999.

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Table 1.13 Interest Rates on Deposits offered by Finance Companies

Company	Rating	Interest rates		
		1 yr	2yr	3yr
First Leasing	MAAA	12.0	13.0	13.5
IL & FS	MAAA	12.5	12.8	13.0
Sundaram Finance	FAAA	12.0	12.5	13.0
Lakshmi General Finance	MAAA	12.0	12.5	13.0
Bajaj Auto Finance	FAAA	12.0	—	12.0
HDFC	FAAA	10.5	11.5	12.5
ICICI	FAAA	—	10.5	11.5
IDBI	FAAA	10.5	11.0	12.0
SIDBI	FAAA	10.0	10.5	11.5
Tata Sons	FAAA	—	—	12.0
Tata Investment Corp.	FAAA	—	—	12.0
Cholamandalam Finance	FAA+	12.0	13.0	13.5
Apple Finance	MAA+	14.0	14.0	14.0
Kotak Mahindra	FAA+	13.0	13.3	13.5
Ashok Leyland Finance	FAA	—	14.0	14.5
HUDCO	FAA	10.8	11.5	12.8
M & M Financial services	FAA-	13.5	14.0	14.5
Birla Global Finance	FAA-	—	—	14.0
SICOM	FAA-	11.0	12.0	12.5
L & T Finance	FAA-	13.5	13.5	14.5
TN Transport Finance	FA+	14.0	14.0	14.0
Wipro Finance	FA	14.0	14.0	14.0
Simpson General Finance	FA	14.0	14.5	15.0

MAAA, FAAA - Highest safety   MAA, FAA - High safety

FA - Adequate safety

+, –, Comparative position within the group

(iv) *Security:* Security of the deposits of the NBFCs is much lower than the deposits with banks. To improve the liquidity of NBFCs the percentage of liquid assets required to be maintained by them has been enhanced from 12.5 percent to 15 percent with effect from April 1999 respectively. Company Law Board is authorised to direct the defaulting NBFCs to repay the deposits. In spite of the strict rules and regulations laid down by RBI the default rate is high in the case of NBFCs.

2. Tax sheltered savings scheme

Tax sheltered savings schemes are of great importance to the investors in the tax-paying category. The tax sheltered savings schemes offer tax relief to those who participate in their schemes according to the income tax laws. The important tax sheltered savings schemes are:

(a) *Public provident fund scheme (PPF):* PPF earns an interest rate of 12 percent per year, which is exempted from the income tax under sec 88. The individuals and Hindu undivided families can participate in this scheme. The maximum limit per annum for the deposit is ₹ 60,000. The interest is accumulated in the deposit. It provides early withdrawal facilities from 7th year and every year thereafter, the account holder has an option to withdraw 50 per cent of the balance to his

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credit 4 years ago or 1 year ago whichever is lower. The facility makes PPF a self-sustaining account from 7th year onwards.

(b) *National savings scheme (NSS):* This scheme helps in deferring the tax payment. Individuals and HUF are eligible to open NSS account in the designated post office. The NSS-87 gives 100 per cent income tax rebate but the interest as well as the capital are fully taxable if withdrawn during their lifetime. Investments in the NSS scheme, with a lock in period of 4 years qualify for a rebate of 20 per cent under Section 88 of the Income Tax Act, subject to a maximum of ₹ 12,000. The investment also earns an interest rate of 11 per cent per year covered by Sec 80L. Compared to other tax savings' instruments the return offered by this scheme is lower.

On the liquidity aspect, withdrawal is permitted at any time after four years from the end of the financial year in which the account is opened. The entire amount can be withdrawn. The account can be closed on the expiry of 4 years. There is no fixed tenure for investment. One can also keep the account alive and earn interest at 11 percent per annum.

As a tax saving instrument "anytime" withdrawal after 4 years is the only interesting feature to the prospective investor. The tax deduction at source at the rate of 20 percent on the entire amount withdrawn has proved too costly to the investors.

(c) *National savings certificate (6 yrs.) - III:* This scheme is offered by the post office. These certificates come in the denominations of ₹ 500, 1,000, 5,000 and 10,000. The contribution and the interest for the first 5 years are covered by Sec 88. The interest is cumulative at the rate of 12% per annum and payable biannually is covered by Sec 80L. No withdrawals are permitted. There is no deduction at maturity.

3. Life insurance

Life insurance is a contract for payment of a sum of money to the person assured (or to the person entitled to receive the same) on the happening of event insured against. Usually the contract provides for the payment of an amount on the date of maturity or at specified dates at periodic intervals or if unfortunate death occurs. Among other things, the contracts also provide for the payment of premium periodically to the corporation by the policy holders. Life insurance eliminates risk. The major advantages of life insurance are given below:

(i) *Protection:* Saving through life insurance guarantees full protection against risk of death of the saver. The full assured sum is paid, whereas in other schemes only the amount saved is paid.

(ii) *Easy payments:* For the salaried people the salary savings' schemes are introduced. Further, there is an easy instalment facility method of payment through monthly, quarterly, half yearly or yearly mode.

(iii) *Liquidity:* Loans can be raised on the security of the policy.

(iv) *Tax relief:* Tax relief in Income Tax and Wealth Tax is available for amounts paid by way of premium for life insurance subject to the tax rates in force.

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Schemes of LIC

LIC offers a wide range of schemes to suit the needs of the individual investor.

(i) Basic life insurance plans

Whole life assurance plan: It is a low cost insurance plan where the sum assured is payable on the death of the life assured and premiums are payable throughout life.

Endowment assurance plan: Under this plan, the sum assured is payable on the date of maturity or on the death of the life assured, if earlier.

Both these plans are available with the facility of paying the premiums for a limited period.

(ii) Term assurance plans

Two-Year temporary assurance plan: Under this plan, term assurance for two years is available. The sum assured is payable only on the death of the life assured during the term.

Convertible term assurance plan: It provides term assurance for 5 to 7 years with an option to purchase a new, Limited Payment Whole Life Policy or an Endowment Assurance Policy at the end of the selected term; provided the policy is in full force.

Bima sandesh: This is basically a Term Assurance Plan with the provision for return of premiums paid, on the life assured surviving the term.

Bima kiran: This plan is an improved version of Bima Sandesh with an added attraction of loyalty addition, in-built accident cover and Free Term Cover after maturity, provided the policy is then in full force.

(iii) Plans for children

Various children's Deferred Assurance Plans are available viz, Jeevan Balya, and Jeevan Kishore. Jeevan Sukanya is a plan specially designed for girls. The Children's Money Back Assurance Plan is specially designed to provide for children's higher educational expenses with added attractions of guaranteed additions, loyalty additions and optional family benefit.

(iv) Pension plans

These plans provide for either immediate or deferred pension for life. The pension payments are made till the death of the annuitant (unless the policy has provision of guaranteed period). Both the Deferred Annuity and Immediate Annuity plans are available with the return of the GIVE amount on death after vesting under the Jeevan Dhara Plan and return of Purchase Price on death under the Jeevan Akshay Plan.

(v) Jeevan Sarita

This is a Joint-life-last survivor-annuity-cum-assurance plan (for husband and wife) where the claim amount is payable partly in lumpsum and partly in the form of an annuity. Balance sum is assured on the death of the survivor.

Tax Benefits from Life Insurance

At present, deductions are allowed upto ₹ 15,000/- u/s 80 DD in respect of medical treatment of handicapped dependents and another amount upto ₹ 20,000/- u/s 80 DDA in respect of deposit made for maintenance of handicapped dependents under any scheme framed for their behalf by LIC i.e., "Jeevan Aadhar".

A deduction to an individual for any amount paid or deposited by him in the Jeevan Suraksha Plan for receiving pension (from a fund set up by the Corporation) is allowed. The deduction will be restricted to ₹ 10,000/-. According to Section 88, the amount of income-tax payable on the total taxable income can be reduced by 20% (25% in case of author, playwright etc.) of the aggregate amount paid towards premium subject to the maximum of ₹ 70,000/- in case of an individual and HUF. Premiums paid to effect or to keep in force an insurance policy on the life of the assessee or on the life of the wife or husband or any child (whether minor or major) of the assessee, irrespective of the status of the child are also eligible for income tax deduction.

Premiums paid under an insurance policy effected jointly on the lives of a husband and wife or in the case of a Hindu Undivided Family jointly on the lives of two or more members of the family are eligible for the prescribed deduction under Section 88. However, such relief is not available on premiums paid on policies singly or jointly on the lives of other relatives.

4. Mutual funds

Investment companies or investment trusts obtain funds from large number of investors through sale of units. The funds collected from the investors are placed under professional management for the benefit of the investors. The mutual funds are broadly classified into open-ended scheme and close-ended scheme.

(i) Open-ended schemes

The open-ended scheme offers its units on a continuous basis and accepts funds from investors continuously. Repurchase is carried out on a continuing basis thus, helping the investors to withdraw their money at any time. In other words, there is an uninterrupted entry and exit into the funds. The open-end scheme has no maturity period and they are not listed in the stock exchanges. Investor can deal directly with the mutual fund for investment as well as redemption. The open-ended fund provides liquidity to the investors since the repurchase facility is available. Repurchase price is fixed on the basis of net asset value of the unit. In 1998 the open-ended schemes have crossed 80 in number.

(ii) Closed-ended funds

The close-ended funds have a fixed maturity period. The first time investments are made when the close end scheme is kept open for a limited period. Once closed, the units are listed on a stock exchange. Investors can buy and sell their units only through stock exchanges. The demand and supply factors influence the prices of the units. The investor's expectation also affects the unit prices. The market price may not be the same as the net asset value.

Sometimes mutual funds with the features of close-ended and open-ended schemes are launched, known as interval funds. They can be listed in the stock exchange

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or may be available for repurchase during specific periods at net asset value or related prices.

(iii) Other classification

The open-ended and close-ended schemes are classified on the basis of their objectives. Some of them are given below;

Growth scheme: Aims to provide capital appreciation over medium to long term. Generally these funds invest their money in equities.

Income scheme: This scheme aims to provide a regular return to its unit holders. Mostly these funds deploy their funds in fixed income securities.

Balanced scheme: A combination of steady return as well as reasonable growth. The funds of these schemes are invested in equities and debt instruments.

Money market scheme: This type of fund invests its money on money market instruments like treasury bills, commercial paper, etc.

Tax saving schemes: This type of scheme offers tax rebates to investors. Equity linked saving schemes and pension schemes provide exemption from capital gains on specific investment.

Index scheme: Here investment is made on the equities of the index. Benchmark index is BSE Sensex or NSE–50. The returns are approximately equal to the return on the index.

Basis for selection

Investors can choose the mutual funds on the basis of the

- Net assets
- Portfolio composition
- Income composition
- Gross income as a percentage of net assets
- Expense ratio
- Realised gains per unit
- Unrealised appreciation per unit

SEBI regulations: The SEBI (mutual funds) Regulations 1996 were amended in January 1998. It prohibited mutual funds from investing in unlisted or privately placed securities by associate and group companies of the sponsors.

A limit of 25 percent of the net asset value of the fund was imposed on its investment in listed securities of the group companies of the sponsors. Mutual funds are required to fully disclose their portfolio in annual reports. Draft Standard Offer Document (SOD) with minimum disclosure requirements is laid down to enable the investors to make informed investment decisions. SEBI decided that all the open-ended schemes including Unit Scheme-64 of Unit Trust of India should declare their net asset value on a daily basis.

5. Real assets

(i) Gold and silver

For ages, gold and silver have been considered as a form of investment. They are considered as best hedge against inflation. This is a favourite form of investment amongst

the rural and semi- urban population. Besides, investors tend to invest in jewellery instead of pure gold. As a result, when they buy jewellery, the price realisation is usually less than total purchase price (this is due to higher making charge of jewellery). The price of gold has declined in the later part of the nineties. Gold prices are suppressed because of large supplies overtaking the demand. The government has allowed imports of gold to certain banks and agencies and they have huge stocks of gold. The gold prices remained depressed in the international markets too in the late nineties. The following reasons are cited for the low price of gold in the international market.

- Weak demand from Asian countries which are the largest consumers of gold.
- Continuing pressure on central banks to dishoard gold.
- Legislative measure like the Sweedish Government move to delink gold from Swiss Franc and lower gold reserves by the European union.

(ii) Real estate

The real estate market offers a high return to the investors. The word real estate means land and buildings.

- High capital appreciation compared to gold or silver particularly in the urban area.
- Availability of loans for the construction of houses.
- Tax rebate is given to the interest paid on the housing loan.
- The possession of a house gives an investor a psychologically secure feeling and a standing among his friends and relatives.

  Apart from making investment in the residential houses, the people in the higher income bracket invest their money in time share plans of the holiday resorts and land situated near the city limit with the anticipation of a capital appreciation. Farm houses and plantations also fall in the line. In spite of the fast capital appreciation investors generally do not invest in the real estate apart from owning one or two houses. The reasons are:

  Requirement of huge capital. To purchase a land or house in the urban area, the investor needs money in lakhs whereas he can buy equity, gold or other form of investment by investing thousands of rupees.

- Malpractices. Often-gullible investors become cheated in the purchase of land. The properties already sold are resold to the investors. The investor has to lose the hard-earned money.
- Restriction of the purchase. The land ceiling Act restricts the purchase of agricultural land beyond a limit.
- Lack of liquidity. If the investor wants to sell the property, he cannot immediately realise the money. The waiting period may be months or years.

  The points to be taken care of while purchasing the real estate are:

- The plots should be approved by the local authority because on the unapproved layout construction of a house is not permitted.
- Possibility of capital appreciation. It depends upon the locality and other facilities of the site.

- Originality of title deeds. The site should be free from encumbrance. Encumbrance certificate for a minimum period of latest 15 years should be got from the Registrars Office.
- Plinth area should be verified.

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Credibility of the broker: The role of broker cannot be undermined because it is he who introduces to the parties and location of site. He should be faithful and loyal otherwise the investor finds himself in trouble.

(iii) Art

Paintings are the most sought after form of art. The prices in the art market are rising and this rise is expected to continue. The trend in the art market today is to invest in young upcoming painters whose prices will soar over the years. People who have bought paintings from young painters in the last few years are happy with the kind of financial as well aesthetic appreciation they have received over the years. For example Manash Kamal Bishwash who used to sell A 22" × 30" mixed media on paper for ₹ 30,000 in 1997, commands a price of ₹ 45,000 in 1999. If an investor likes to buy paintings as a form of investments he has to consider the following points:

(1) Paintings of the young painters. The works of established painters are costly and scope for appreciation in their values are limited. But prices of the good quality paintings of the young painters may increase quickly.

(2) Should possess the basic idea of the painting. This is needed to decide the quality of the paintings. He should be able to judge the primary attributes of the paintings such as spontaneity, nature of strokes, colour combination and originality.

(3) The investor should have aesthetic sense because he may or may not be able to resell the paintings. Therefore when he possesses the art piece the investor should have a sense of fulfillment.

(iv) Antiques

In western countries' investment in antiques is more common than in India. The antique is an object of historical interest. It may be a coin, sculpture, manuscript or any other object of olden days. The owner of the antique has to register himself with Archeological Society of India. The society after examining the authenticity of the antique issues a "Certificate of Registration". Any dealings i.e. purchase and sale of antique should be informed to the society. The government has the right to buy the antique from the owner, if it wants to keep it in the museum. In the case of investment, the investor has to be careful about the fake antique and the rise in the price of the antique is uncertain.



Derivative: A derivative is a financial instrument whose value is based on one or more underlying assets.

Check Your Progress

15. Differentiate between negotiable securities and non-negotiable securities.
16. What are the Government or gilt-edged securities?
17. What is Life Insurance?

1.9 DERIVATIVE INSTRUMENTS

A **derivative** is a financial instrument whose value is based on one or more underlying assets. In practice, it is a contract between two parties that specifies conditions (especially the dates, resulting values of the underlying variables, and notional amounts) under which payments are to be made between the parties. The most common types of derivatives are: forwards, futures, options, and swaps. The most common underlying assets include: commodities, stocks, bonds, interest rates and currencies.

Let us take an example of Reliance Industries. On November 22, 2012 the share was trading at ₹766 in the stock market. When we see the Reliance Future contract with one-month maturity, it would be quoting at a discount or premium depending on the market perception. How is this cost of carry determined? If the rate of interest is 12 per cent per annum, the cost of carry for one month in Reliance would be 766 × 12/100 × 1/12 = 7.66 so the Reliance future contract will quote at about ₹774.

All business dailies carry the Future and Options quotes.

F&O Corner-NSE

Positive Trend

Company	Spot Price	Future Price	% Diff	OI Chg(%)
Alok Inds.	11.10	11.20	0.90	-5.69
Adani Power	47.00	47.30	0.64	-29.74
Punj Lloyd	49.95	50.25	0.60	-40.11
Indian Hotel	60.75	61.10	0.58	-14.84
Welspun Corp	102.95	103.55	0.58	-60.59
Aditya Bir.N	1028.55	1033.80	0.51	-28.32
India Cement	83.60	83.95	0.42	-27.43
Uco Bank	71.45	71.75	0.42	-20.40
GVK Power	12.45	12.50	0.40	-26.55
Bharat Forge	258.40	259.40	0.39	-46.18

Negative Trend

Company	Spot Price	Future Price	% Diff	OI Chg(%)
GMR Infrast.	17.75	17.70	-0.28	-8.69
HDIL	103.45	103.25	-0.19	-26.62
Asian Paints	4083.40	4076.90	-0.16	-5.43
Indian Oil C	259.45	259.05	-0.15	-24.90
Piramal Entp	492.60	492.10	-0.10	-56.39
Sterl.Inds.	98.50	98.40	-0.10	-30.56
ACC	1382.80	1381.55	-0.09	-8.52
Coal India	360.45	360.20	-0.07	-19.19

Future OI Losers

Company	Open Interest	Chg in OI (%)	Trd Qty	Chg in TQ (%)
Welspun Corp	7384000	60.59	103.55	0.44
Piramal Entp	203000	56.39	492.10	0.39
Suzlon Enrgy	38352000	50.77	15.50	3.68
Tata Comm.	1433000	47.37	229.20	-1.06
Arvind	3272000	46.78	84.90	2.29
JSW Steel	4295000	46.65	722.85	0.67
Bharat Forge	1555000	46.18	259.40	1.99
JSW Energy	10532000	44.82	63.00	3.19
Guj.Fluoroch	1059500	40.26	327.30	5.39
Punj Lloyd	12120000	40.11	50.25	1.52

Top Sectoral OI Gainers

Sector	Open Interest	Chg in OI (%)	Trd Qty	Chg in TQ (%)
Consumer Dur.	14816000	8.74	15701000	132.37
Retail	14138000	8.39	30686000	102.68
Paints	295875	5.43	144750	9.56
Breweries	7176250	5.29	9360250	17.35
Automobiles	65723625	5.16	57176750	41.03
Telecom Ser.	111905000	5.07	203775000	203.80
Pesticides	9270000	4.53	5814000	146.36
Shipping	7160000	3.68	4020000	223.67
Entertainment	41109000	3.33	57889000	109.38

Active Calls

Company	Contract	Traded Qty	Open Interest	Chg in OI (%)
NIFTY	5600.00-Nov	25019150	4334200	-5.19
NIFTY	5700.00-Nov	22329000	8678350	-1.03
Reliance Com	65.00-Nov	14812000	3532000	-28.09
Unitech	27.50-Nov	13016000	10560000	-3.86
Reliance Com	70.00-Nov	12216000	3692000	36.54
Reliance Com	67.50-Nov	11800000	1788000	92.67
NIFTY	5800.00-Nov	8543800	8195150	-4.68
Jaiprak.Asso	90.00-Nov	7272000	5512000	4.95
IFCI	30.00-Nov	4760000	8032000	0.00

Active Puts

Company	Contract	Traded Qty	Open Interest	Chg in OI (%)
NIFTY	5600.00-Nov	31760600	8540600	16.97
NIFTY	5500.00-Nov	13550050	8674350	2.98
NIFTY	5700.00-Nov	13146900	3754300	1.68
Reliance Com	65.00-Nov	8120000	2144000	230.86
Reliance Com	62.50-Nov	3932000	1284000	52.13
Reliance Com	60.00-Nov	3808000	2384000	-20.85
NIFTY	5400.00-Nov	3385350	6709650	-7.09
Tata Motors	260.00-Nov	3351000	1911000	-5.44
Jaiprak.Asso	90.00-Nov	3312000	2408000	1.35

Market-Wide Position Limit

Company	MWPL (Lakh)	OI (Lakh)	MWP (%)	Chg in OI (%)
Pantaloon Re	217.88	213.56	98.02	13.02
Karnatak Bnk	376.61	356.80	94.74	-13.11
Sintex Inds.	346.76	317.88	91.67	0.32
Punj Lloyd	417.26	377.76	90.53	-2.09
Welspun Corp	236.57	212.92	90.00	-0.16
Indiabulls R	479.50	430.00	89.68	11.86
Reliance Com	1310.90	1156.88	88.25	7.82
IVRCL	529.71	467.24	88.21	-8.33
Suzlon Enrgy	1672.92	1389.83	83.08	-10.42

Top Sectoral OI Losers

Sector	Open Interest	Chg in OI (%)	Trd Qty	Chg in TQ (%)
Capital Goods	188059500	7.84	191928500	212.73
Sugar	56656000	5.46	26128000	76.64
Metals	63174000	4.67	46522000	236.63
Textiles	48574000	4.03	30007000	137.59
Steel	84473000	3.94	74110500	248.83
Tyres	21281125	3.49	13084125	52.32
Auto Ancillaries	3306000	3.33	1588000	153.67
Construction	82474000	3.19	39992000	17.02
Trading	8863000	3.12	7736000	103.36

These segments offer all relevant information and details about the company, that is, what its spot price is and what its future price is. It also provides the Open

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Interest and contract of the company along with the percentage change in the price of the future from the previous day and percentage change in the open interest of a derivative contract in a day.

Open interest refers to the total number of options and futures contracts that are not closed out on a particular day. It is not the volume of option and future trades.

Derivative market is a network of buyers and sellers who trade into these contracts. The normal, as against derivative market, where delivery takes place instantaneously as payment is made, is known as *spot market*. It is common though not completely accurate that people use the terms derivative market and forward market interchangeably. Derivative market is a broader term and includes forward market, future market, option market and other applicable instruments.

Derivatives are the contracts that obtain their value from the value of core asset upon which the contract is made. Such asset is also known as underlying asset. Underlying assets can be anything, from tangibles assets such as securities, currencies, commodities, real assets or intangibles like power, monsoon, interest rates, defaults or even storms etc.

Generally the derivative markets are much more liquid than spot and cash markets due to large number of speculators operating in it. Speculators are directional players who wish to benefit from anticipated change in asset prices.

Regulation of derivative instruments

Derivatives in India are regulated under following acts:

- Securities Contracts (Regulation) Act, 1956
- Securities and Exchange Board of India Act, 1992

These acts define the meaning and scope of derivative contracts, transaction limits and methods, role, eligibility and functions of exchanges dealing in derivative contracts etc.

1.9.1 Channels of Derivative Markets

Derivative instruments trade on two kind of markets, over the counter (OTC) market and exchange market.

- **Over the counter market (OTC):** Derivatives transaction take place privately between buyers and sellers either directly or through brokers. In many instances market makers also exist who act as a counter party to each buyer and seller. The biggest advantage is that derivative instruments can be customized to the needs of parties involved. However there exists a ***counter party risk*** that the other party might default intentionally or unintentionally if quantum of loss is huge. We saw that in recent financial meltdown of 2008.
- **Exchange Market:** Derivative transactions, in exchange market, take place via organized system of exchange. In this market the features of derivative contracts are standardized. There is no scope of customization to fit the needs of users. However, exchange tries to create so much variety of these contracts that the needs of end-users are fulfilled. A futures contract allows a trader to undertake a contract to accept or make delivery of a commodity or financial asset in the future on a specified date, under specified conditions, for a price agreed on today. There are many types of futures, such as individual stock

futures, stock index futures, commodity futures and currency futures. For example, futures contracts trade at NSE with huge range of maturity and size.

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Exchange acts like a counter party to all buyers and sellers and guarantees the settlement of contract at maturity. An Exchange at the same time takes adequate risk management measures to protect itself from the default of counter parties. Such measures include:

- o **Submission of initial Margin:** Parties who enter into either a long or short position in the contract must deposit a minimum required sum with the exchange as guarantee for fulfillment of contractual obligation. Initial margin can roughly range anywhere between 5% and 70% of contract value, depending upon the volatility and risk of a security.
- o **Daily Mark to market:** Under this policy exchange evaluates value of contract on a daily basis and ascertains the quantum of loss/gain to counter party. If counter party is in gain as the price of underlying moves favorably, exchange credits the initial margin account with respective gain. Similarly initial margin account is debited if there is a loss in position due to unfavorable price movement at the end of the day.
- o **Additional Margin Requirement:** In case initial margin account falls below specified threshold known as ***maintenance margin***, exchange asks the counter party to deposit additional margin in time. This act secures the exchange from potential default by counterparty in case of huge loss. If counterparty fails to replenish initial margin account, exchange mandatorily squares off the position of counterparty and returns remaining margin.

1.9.2 Types of Trade Positions

Investors can enter into derivative contracts with either of the following positions: long, short and neutral.

In terms of financial trading, a position refers to a binding commitment to purchase or sell a given amount of financial instruments, e.g., securities, currencies or commodities for a specific rate. There are basically two kinds of positions: long and short.

- **Long:** When the contract is such that the investor benefits from rise in prices of underlying, he is said to be holding a long position on the underlying asset. It happens when investors possess, have purchased or are likely to receive the asset in future. When a trader is 'long', he benefits from the increase in price and loses from the decrease in price. Given below are some scenarios of an investor being long on an asset.
    - o An investor who is in ownership of Reliance Industries Ltd (RIL) stock is said be 'long' on RIL.
    - o An exporter firm of IT services who expects to receive US dollars (USD) in a month's time for services rendered recently is said to be long on USD.
    - o A gold mining company is said to be long on gold.
    - o A global company that receives its sales proceeds in Australia in AUD is said to be long in AUD.

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- **Short:** When investors benefit from the fall in price of underlying asset, they are said to be holding a short position on the underlying asset. Just as holding a long position amounts to 'buying the asset', holding short position amounts to 'selling the asset'. For example, when you buy a put on IBM, you are a short IBM. Similarly, when you sell a call on IBM, you are a short IBM. However, intricacy is that seller does not already own the asset, rather borrows the asset before selling it. The borrowing is time bound and borrower will have to buy back the asset in time and return to lender as it is. During the process borrower pays an interest to the lender on the value of borrowed asset. Short seller earns money if her initial sales price was much higher than subsequent buy price, net of cost of borrowing.

  Investors are short when they have sold the borrowed asset, are supposed to return an asset, are committed to deliver an asset they don't already own, are supposed to spend/pay in particular currency etc. Given below are some scenarios of an investor being short on an asset.

  - An investor who has entered into a forward contract with counter party (who is long) to deliver 1000 shares of RIL one month later at a specified price is said to be short on RIL.
  - An investor who commits sale of a security in spot market that he does not already own is said to be short on that security.
  - An importer who is supposed to pay back USD to its suppliers for recent purchase of raw materials is said to be short on USD.
  - A commitment to sell an asset
  - When a global company with multinational operations is supposed to make payments in INR that it does not already own is said to be short on INR

Note: You would notice in all the above examples that long benefits if price of underlying asset moves up and short benefits when price of underlying moves down.

- **Neutral:** When investor hold equal amount of long and short position, it is said to be neutral position. In a market neutral strategy, up or down movement of market does not affect the strategist.

  Investors may go neutral for any of the following purposes:

  - **Hedging:** The major application of derivatives is that they help in managing risk, a function known as hedging. Hedging is undertaken to reduce or eliminate risk exposure to an asset, for example, Infosys might want to reduce its exposure to fluctuations in USD.

    Derivative strategies can be deployed to meet this objective. Hedgers first ascertain their inherent position in the asset and then undertake a derivative transaction to create equal opposite position. In above case Infosys is long on USD as it expects to receive USD in future and a fall in USD value against INR can cause loss to Infosys. Hence Infosys must go short on USD by equal amount as that of its receipts. If value of USD rises, Infosys would gain on receipts and loose on derivatives, with no net impact. Similarly if USD falls, Infosys would again end up in no impact position.

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- o **Arbitrage:** Arbitrage is a risk free trade undertaken to reap benefit of price anomalies prevailing between two identical securities in same market or same security in two different markets. Arbitragers simultaneously short overvalued security and long undervalued security by same quantum. Arbitrageurs, hence essentially create a market neutral strategy so that movement of market does not affect them and they may take advantage of price difference.
- o **Speculators:** Speculators, generally, are the most frequent

1.9.3 Types of Derivative Contracts

Derivative contracts are subject to infinite innovation and no text can classify their exhaustive list, yet an effort is made as follows:

1. Forward Contract

A contract that where buyer commits to deliver a specified quantity of underlying asset to the seller at a predetermined price, place and date. No physical exchange of money or asset takes place till maturity of contract. Buyer in this contract is said to be 'long' and seller is said to be 'short' on the underlying asset. Forward market transactions in India take place through over the counter (OTC) market.

The most common form of a forward contract is a contract whereby one party agrees to deliver an asset at a specified time in the future. The price at which the asset would be delivered is agreed upon at the time when the contract is entered into. The transfer of ownership in the underlying asset does not take place at the time of entering the contract but it occurs on the delivery date. Also, there is no immediate exchange of cash.

The profit or loss on the contract depends on the price of the underlying asset prevailing on the settlement date. For example, A agrees to deliver 50 tons of wheat to B after six months at a price of ₹15, 000 per ton. If, after six months, the spot price of wheat rises to ₹15,500/ton, B, makes a profit of ₹25,000 [(₹15,500 – ₹15,000)*50]. In this case, A incurs a loss of an equivalent amount as he has agreed to sell the wheat at a price of ₹15,000 per ton against the prevailing price of ₹15,500 per ton. On the other hand, if the spot price of wheat after six months is ₹14,500/ton, A gains and B loses ₹25,000 on the contract.

2. Futures Market

A future contract is a variant of forward contract with a little change that it is standardized and trades at exchange. There is neither a scope of customization nor a counter party risk in this case. Moreover, parties involved have to comply with margin requirements set by the exchange.

You can understand the concepts of futures market with the help of the following example:

Suppose a trader borrows ₹ 100 and buys ABC stock which is currently trading at ₹ 100. Let us assume that the ABC stock pays ₹ 15 as dividend in six months. The trader will receive ₹ 15 as dividend and he will invest the proceedings for the remaining six months @ 8%. The future value of the stock P1 is unknown to the trader. The Table 1.14 gives the cash flow of the trader.

Table 1.14 *Cash Flows from Carrying Stock*

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Situation 1	
Borrow ₹100 for 1 year at 10%	+ 100
Buys ABC stock	– 100
Situation 2	
Received dividend	+ 15
Invested ₹15 for 6 months at 8%	– 15
Situation 3	
Collect proceeds from dividend invested (after six months)	15.60
Sell ABC stock	P_t
Repay the debt	– 110.00
Total Profit = P_t + 15.60 – 110	

3. Options Contract

Unlike future and forward contracts, there is no obligation with ***option buyer*** to comply with the contract and legally so. Whereas ***option seller*** is mandated to fulfill contractual obligations if option buyer so desires.

You might be wondering that equation is tilted too much in favor of the option buyer and why would someone assume the position of an option seller. There is a reason, the option buyer has to pay the option seller a fixed non refundable expense right at the beginning of contract, amount is known as ***'option premium'.***

Hence we can conclude that option buyer buys the right but not the obligation, whereas option seller's position is just reverse. Option seller takes this risk in temptation of initial premium. Option seller is also known as option writer.

There are two kinds of options contract:

- **Call Option:** It grants the option buyer a **right to buy** the underlying security. Call Option buyer is said to be long on underlying and gains with prices moving up. Call Option seller is in exact opposite position.
- **Put Option:** It grants the option buyer a **right to sell** the underlying security. Put Option buyer is said to be short on underlying and gains with prices moving down. Put Option seller is in exact opposite position.

  Options largely trade on exchange as standardized contracts. There are rare exceptions when options have been seen trading on OTC market as well. Options markets in India are pretty liquid for contracts with nearer maturity, whereas almost dormant for long maturity contracts. Similar situation stands true for futures contract as well.

  For example, X buys a November 2010 call option of 100 shares of Reliance Industries Ltd (RIL) at an exercise price of ₹1150 per share and pays a premium of ₹9 per share. By virtue of this option X gets the right to buy 100 shares of RIL from the seller of the option, on or before November 25, 2010 (last Thursday of November, 2010, the settlement date). At the same time the option creates an obligation for the seller of the option to sell 100 shares of RIL at ₹1150 per share on or before November 25, 2010.

Given below are **key terminologies** related to options:

- o **American Options:** Type of an options that can be exercised at any time during before maturity
- o **European Option:** Type of an options that can be exercised only on the day of maturity
- o **Strike Price:** The predetermined price at which underlying would bought/sold if option is exercised by the option holder.
- o **In the money (ITM) options:** If spot price of underlying is higher than the strike price, enabling net inflow to option buyer if option is exercised. Option holder may choose to exercise or wait for option to go deeper in the money.
- o **Out of money (OTM) options:** If spot price of underlying is lower than the strike price, leading to net outflow from option buyer if option is exercised. Out of money options are never exercised.
- o **At the money (ATM) options:** When strike price and spot price are equal to each other.
- o **Option Premium:** Also known as the price of an option, it is the amount that buyer of an option pays to the seller of an option. This amount is determined solely on the basis of demand and supply forces. Generally it depends upon mood and expectations of market. If it is highly expected that asset price will go up, value of call option will rise and put option will fall. Reverse is true if expectations are otherwise. In fact there are many factors that affect the price of an option, but beyond the purview of this reading.

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Option Premium: Also known as the price of an option, it is the amount that buyer of an option pays to the seller of an option

4. Swaps

Swap contracts bind both the parties involved to exchange series of cash flows (or obligations) originating from underlying asset (or liability). For example, one party in swap might be obligated to pay a fixed interest payment on a notional principal whereas other party might be obligated to pay variable interest as per predetermined formula using the same notional principal. This type is known as interest rate swap. Similarly, currency swaps may exist in which parties involved exchange foreign currencies with each other. There are numerous variants of swaps. If you notice, swap can be perceived as a series of forward contracts as well.

Swaps require customization of terms of contracts to the needs of involved parties and hence trade almost invariably on OTC markets.

1.10 SUMMARY

Some of the important concepts discussed in this unit are:

- Investments may be defined as a commitment of one's money in one or more of asset classes in anticipation of some gains while simultaneously bearing risk of uncertainty.

Check Your Progress

18. When is an investor said to be holding a long position on the underlying asset?
19. When is an investor said to be holding a short position on the underlying asset?
20. What is the function of call options?

NOTES

- Thorough due diligence about investment alternatives and some level of security of principal and returns can differentiate between investing, speculating and gambling.
- Following qualities are essential for a commitment to be known as a 'secure investment':
  - o It expects gains while bearing associated risks.
  - o It is based upon thorough analysis.
  - o It has a high degree of security of returns and principal.
- Utility of an investment is calculated primarily on the basis of returns it generates.
- Investments can be divided into the following five categories:
  - o **Securities:** equity, fixed income and units of PIVs
  - o **Commodities:** bullion, agro, metals and energy
  - o **Real Investments:** real estate, art and collections, machineries and live stock
  - o **Contracts and intangibles**
  - o **Currencies:** foreign currencies and assets denominated in such currencies
- A portfolio is a combination of various securities.
- Portfolios can be constructed according to the various approaches, which are listed as follows:
  - o Traditional approach
  - o Modern approach
- In the traditional approach the constraints, investor's need for current income and income in constant rupees are analysed.
- The traditional approach of a portfolio makes the entire financial plan of an individual investor.
- Some important constraints that assist in framing the objectives of a portfolio are as follows:
  - o Liquidity
  - o Safety
  - o Time horizon of the investment
  - o Tax consideration
  - o Temperament of the individual investor
- The general objectives of the portfolio are as follows:
  - o Current income
  - o Constant income

- o Capital appreciation
- o Preservation of capital

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- Whether a portfolio is a bond portfolio or a stock portfolio or a combination of both bond and stock is decided based on the objectives.
- After the objectives of a portfolio are chosen, only then the equity component of a portfolio is decided.
- At present, a wide variety of investment avenues are open to the investors to suit their needs and nature. Knowledge about the different avenues enables the investors to choose investment intelligently. The required level of return and the risk tolerance level decide the choice of the investor.
- The investment alternatives range from financial securities to traditional non-security investments. The financial securities may be negotiable or non-negotiable.
- The negotiable securities are financial securities that are transferable. The negotiable securities may yield variable income or fixed income. Securities like equity shares are variable income securities. Bonds, debentures, Indra Vikas Patras, Kisan Vikas Patras, Government securities and money market securities yield a fixed income.
- The non-negotiable financial investment as the name itself suggests is not transferable. This is also known as non-securitized financial investments. Deposit schemes offered by the post offices, banks, companies, and non-banking financial companies are of this category. The tax-sheltered schemes such as public provident fund, national savings certificate and national savings scheme are also non-securitized financial investments.
- Mutual fund is another investment alternate. It is of recent origin in India. Within a short span of time several financial institutions and banks have floated varieties of mutual funds. The investors with limited funds can invest in the mutual funds and can have the benefits of the stock market and money market investments as specified by the particular fund.
- The real assets always find a place in the portfolio. They are gold, silver, arts, property and antiques. These are non-financial investment.
- Derivative instruments derive their value from the value of the underlying asset. Derivatives instruments are not an asset but a promise upon those assets.
- Using derivatives, one can take a long, neutral or short position on the underlying.
- There are four broad types of derivatives instruments:
  - o **Forwards:** They carry fixed commitment related to the future date and are traded on the OTC market
  - o **Futures:** They carry fixed commitment related to future date and are traded on the exchange market.
  - o **Swaps:** Series of forward contracts and are generally built around currency or interest rates.

- o **Options:** They carry a right but not the obligation for option holder. To buy an option, the buyer has to pay the seller a non-refundable amount, known as option price or option premium.

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1.11 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Investments may be defined as a commitment of one's money in one or more of asset classes in anticipation of some gains while simultaneously bearing risk of uncertainty.
2. Following qualities are essential for a commitment to be known as a 'secure investment':
   - It expects gains while bearing associated risks.
   - It is based upon thorough analysis.
   - It has a high degree of security of returns and principal.
3. The main investment objectives are increasing the rate of return and reducing the risk.
4. Investments can be classified in five broad categories: securities, commodities, real assets, contracts and currencies.
5. Preferred stocks, as the name itself suggests, are given preference over common stock in case of payments of dividends or liquidation proceeds. But they usually do not carry voting rights.
6. Pooled investment vehicles are the instruments that collect ingestible money from various investors and invest according to predetermined strategy.
7. Speculation essentially involves buying and selling activities with the expectation of getting profit from the price fluctuations.
8. The time horizon involved in gambling is shorter than speculation and investment.
9. The ability to transfer risk allows the commodity hedger a more stable estimate of the cost of a product, which translates into a lower and more stable price for the product. Also, users of commodities are able to "lock-in" the future purchase price of the item they need with only a small cash margin "down payment," thereby allowing a reduction in current inventory.
10. The choice of futures contract actually consists of four decisions: (i) which function commodity, (ii) which expiration month and (iii) whether to be long or short.
11. A diversification of securities gives the assurance of obtaining the anticipated return on the portfolio. In a diversified portfolio, some securities may not perform as expected, but others may exceed the expectation and make the actual return of the portfolio reasonably close to the anticipated one.
12. The two approaches to the construction of the portfolio of securities are traditional approach and Markowitz efficient frontier approach.

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13. The common goals of a portfolio are as follows:
    - Current income
    - Growth in income
    - Capital appreciation
    - Preservation of capital
14. Capital appreciation means that the value of the original investment increases over the years.
15. The negotiable securities are financial securities that are transferable. The negotiable securities may yield variable income or fixed income. The non-negotiable securities are not transferable. They are also known as non-securitized financial investments.
16. The securities issued by the Central, State Government and quasi- government agencies are known as Government securities or gilt- edged securities.
17. Life Insurance is a contract for payment of a sum of money to the person assured (or to the person entitled to receive the same) on the happening of event insured against. Usually the contract provides for the payment of an amount on the date of maturity or at specified dates at periodic intervals or if unfortunate death occurs.
18. When the contract is such that the investor benefits from rise in prices of underlying, he is said to be holding a long position on the underlying asset.
19. When an investor benefits from the fall in price of underlying asset, he is said to be holding a short position on the underlying asset.
20. Call options grant the option buyer a right to buy the underlying security. Call Option buyer is said to be long on underlying and gains with prices moving up. Call Option seller is in exact opposite position.

1.12 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What do you understand by investment?
2. Differentiate between secure investment, gambling and speculation.
3. What are the constraints of the investor in formulating objectives of a portfolio construction?
4. How would an investor select a portfolio based on asset mix objective?
5. What are the negotiable securities available to the investor in the Indian capital market?
6. Differentiate between capital and money market securities.
7. What are the advantages of placing money in the bank deposits?

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Long-Answer Questions

1. Discuss the meaning, nature and scope of investments.
2. Explain how a portfolio is constructed through the traditional approach.
3. Describe the differences between modern approach and traditional approach of portfolio construction.
4. What are the various forms of investment alternatives? Give a detailed account of any five.
5. Explain the various types of derivative instruments and respective positions that can be taken on these.

UNIT 2 INVESTMENT ANALYSIS

NOTES

Structure

2.0 INTRODUCTION

In this unit, you will learn about investment analysis. The two main aspects of investment analysis are return analysis and risk analysis. The investor takes a number of decisions in the process of investment. He has to decide about his risk tolerance level and the nature of assets to be bought, whether they are stocks or bonds or real estates. Once he decides the nature of the asset, he has to select it from the different alternatives. For example, the investor is faced with many decisions while deciding about the investment to be made in the stock market. There are blue chip companies that have a good record of earning profits over the years and giving good return to the investors in terms of dividends, bonus, and price appreciation. In the recent Bull Run of 2000-2006, the small companies and many penny stocks have also given good returns to the investors. The choice depends on the investors and his risk-bearing capacity. The investor selects the stock on the basis of risk and return analysis.

Rational investors, before investing their investible wealth in the stock, analyse the risk associated with the particular stock. The actual return that can be earned from

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a stock may vary and the risk is expressed in terms of variability of return. The downside risk may be caused by several factors, either common to all stocks or specific to a particular stock. Investors, in general would like to analyse the risk factors and a thorough knowledge of the risk helps to plan the portfolio in such a manner that minimizes the risk associated with the investment.

In this unit, you will also learn about the concept of valuation of bonds and their value, rate of return, associated risks and maturity. Establishing the value of bonds involves determining their fair price. This fair price can be defined as the current value of the cash flows that can be generated. This way bonds can be valued by discounting their current expected cash flow using the correct rate of discount. While going through this unit, you will come across the concept of 'yield to maturity'. It can be defined as the discount rate that returns the market price of the bonds, and can thus be considered as the internal rate of return of an investment in the bond made at the observed price.

2.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Discuss the various aspects of investment analysis
- Compute return on individual security and portfolio
- Describe the various models of return analysis
- Identify the various types of risks in investment
- Assess the risks associated with individual security and portfolio
- Calculate the value of a bond

2.2 ASPECTS OF INVESTMENT ANALYSIS

Investments involve undertaking a certain amount of risk and sacrifice in order to earn more money using money. It also involves expected, and a certain amount of unexpected, gains and losses. But this does not mean that investment decisions are left to chance and fate. The risk involved and the expected rate of return influence all investment decisions. All investments are futuristic. They represent hopes of economic or material gains in the future. There are too many choices available to an investor when it comes to investing. This unit discusses the most basic concepts about investment, such as its meaning and scope, objectives, and decisions and factors that affect investment decisions. You have to keep the financial environment in mind while investing, in addition to knowing fully well what to expect of a certain investment.

2.2.1 Returns

The basic investment objectives may be summarized as safety, income and growth. An investor who considers 'safety' as the primary objective will prefer fixed income securities, especially government securities. Of course, returns from them tend to be lower as compared to other types of securities, which, to a certain extent, can be compensated by acquiring long-term fixed income securities. The overall risk in an investor's portfolio can be reduced by distributing risk over a wide variety of equity shares in different industries. In satisfying the second objective, viz., 'income', fixed

income securities stand at the top. In the matter of meeting the third objective, viz., 'growth', which implies capital appreciation, equity investment is the appropriate choice.

Any investor, individual or group has to take into consideration several aspects while investing the savings in 'financial instruments'. One of them is: 'how quickly can the investment be converted in liquid cash if the need arises? Secondly, what is the combination of investment to use so as to reduce the risk of loss and maximise 'return' over a period of time? For example, for older investors it is better to have a combination of 'fixed deposits, bonds and shares'. For the younger investor who can take more risk, investment should be more in shares and less in fixed deposits. This combination is known technically as 'portfolio'. When different portfolio decisions are taken for a group of investors or a large investor, they are termed as 'strategy'.

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In addition to the above primary objectives, there are two important secondary objectives. They are 'liquidity' and 'taxation'. An investment is liquid if it can be converted into cash without loss at short notice. In this respect, money market funds are very liquid. When an investor earns income from investments, the taxation aspect of the income assumes importance. Different investment incomes attract different tax treatments. A suitable investment strategy has to be chalked out bearing these different tax treatments in mind in order to minimize the tax to be paid.

When an investor decides to invest, it is practically impossible to secure the benefits arising from all the objectives mentioned above. This is because the advantages associated with one objective will not generally result in the advantages associated with another. For instance, where the objective of 'growth' is given importance, the investor will be compelled to forego the advantages associated with the objectives of 'safety' and 'income'. As such, most portfolios will have to be guided by one pre-eminent objective while the other objectives will have to be given less weightage in the overall scheme. The investor need only be concerned with the effort in finding, studying and deciding on the opportunities which match his/her objectives. Asset allocation implies diversification of an investor's asset portfolio across all the different classes of assets. The aim of effective asset allocation is to develop an appropriate mix of investments based on the investor's specific investment objectives which maximizes performance potential with an acceptable level of investment risk. In short, chalking out clear investment objectives is a necessary pre-requisite for developing a successful investment strategy.

Return on investment is a method that is used to determine how viable and lucrative it is to make an investment and to compare the relative efficiency of different investments. The **rate of return** is called holding period return, because its calculation is independent of the passages of the time. The result of the computation of a return on investment is expressed in terms of a percentage or ratio. The calculation of 'return' also depends upon who is doing so and for what purpose. For instance, a marketeer may compare the return on investment of any two commodities by dividing the gross profit earned on each product by the marketing expenses incurred in connection with the concerned product. A financial analyst may compare these products by using a different yardstick, i.e., by using a different computation method. For example, an analyst may calculate the return on an investment by dividing the net income generated by an investment by the net value of all resources which have been used to produce and sell the commodity. Thus, return on investment computations can easily be



Rate of return: Rate of return is called holding period return, because its calculation is independent of the passages of the time

manipulated to suit the purpose of the user and the result can be expressed in a variety of ways.

2.2.2 Risks

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Risks: Risk can be defined as a chance that the actual outcome from an investment will differ from the expected outcome

Risk can be defined as a chance that the actual outcome from an investment will differ from the expected outcome. The dictionary meaning of risk is the possibility of loss or injury; the degree or probability of such loss. In risk, the probable outcomes of all the possible events are listed. Once the events are listed subjectively, the derived probabilities can be assigned to the entire possible events. For example, the investor can analyse and find out the possible range of returns from his investments. He can assign some subjective probability to his returns, such as 50% of the time there is a likelihood of getting ₹ 2 per share as dividend and 50% of the time the possible dividend may be ₹ 3 per share. Often risk is interchangeably used with uncertainty. In uncertainty, the possible events and probabilities of their occurrence are not known. Hence, risk and uncertainty are different from each other.

2.3 RETURN ANALYSIS: CONCEPTS, MEASURES AND COMPUTATION OF INDIVIDUAL SECURITY AND PORTFOLIO

The return from the stock includes both current income and capital gain caused by the appreciation of the price. The income and capital gain are expressed as a percentage of money invested in the beginning. The historical returns or ex-post returns are derived from the cash flow received as well as the price changes that occur during the period of holding the stock or any asset. The income flow is the dividend received during the holding period.

Consider the following example.

Example 2.1

Cool Cloth House share price on February 2011 was ₹ 401 (P_t) and the price on October 2011, was ₹480 (P_{t+1}). Dividend received was ₹ 35 (D). What was the rate of return?

Solution:

Now the return (r):

$$r = \frac{P_{(t+1)} - P_{(t)} + D}{P_t} = \frac{480 - 401 + 35}{401} = \frac{114}{401} \times 100$$

$$= 28.43\%$$

In simple terms

$$r = \frac{\text{Price Change + Cash dividend}}{\text{Purchase Price}} \times 100$$

To find out the expost or historical average return of the stock, the arithmetic mean is used.

$$r = 1/n\,(r_1 + r_2 + r_3 \ldots\ldots + r_n)$$

r_1, r_2 and r_3 indicate the returns that occur in different periods of the stock. Now let us consider the following example. The return of stock A for four quarters is as follows:

Check Your Progress

1. Why is the rate of return called the holding period return?
2. Define risk.

I (10), II (8), III (–4), IV (20). The average return for the year was

$$\frac{10+8-4+20}{4}=8.5$$

2.3.1 Computation of Anticipated or Expected Return

The historical return can be calculated by a direct method. The calculation of the anticipated or expected return is different. The ex-ante or future returns are calculated with the help of probability. Probability describes the likelihood of an event, i.e., the likelihood of getting a certain rate of return. The value of the probability ranges from 0 to +1. The value never exceeds one.

The expected rate of return of any stock is the weighted average rate of return. Probabilities of the rate of returns are used as weights.

$$E(R)=\sum_{t=1}^{N}(\text{Probability } P_t)\,(\text{Return } R_t)$$

This can be explained with the help of the following example.

Example 2.2

Return (R_t)	Probability (P_t)	(P_t) (R_t)
10%	0.1	1.0
11%	0.2	2.2
12%	0.4	4.8
13%	0.2	2.6
14%	0.1	1.4
		$\Sigma(P_t)(R_t) = 12.0$

Present value of the return

Suppose an investor holds shares of T.V.S. Suzuki for 12 months. The beginning and end period prices are ₹335 and ₹421. The dividend paid is 35 per cent on the ₹ 10 face value shares. Now, the yield and return can be expressed easily.

$$\text{Dividend Yield}=\frac{D}{P}=\frac{₹3.5}{₹335}\times 100=1\%$$

$$\text{Capital Gains Yield}=\frac{421-335}{335}\times 100=25.7\%$$

$$\text{Holding Period Return}=\frac{421-335+3.5}{335}\times 100=26.7\%$$

The return occurs at the end of the period. If it is to be expressed at the beginning of the holding period, it has to be given in terms of the present value.

$$P_0=\frac{D_1}{1+r}+\frac{P_1}{1+r}$$

P_0 = Present selling price
P_1 = Selling price at the end of one year period
D_1 = The dividend received during the one year holding period
r = Investor's required rate of return

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With the help of the above-mentioned formula, the investor can find out whether the price he has to offer is suitable to his required rate of return. Now, if the investor wants to get 20 per cent return by holding T.V.S. Suzuki stock for a year, he could find whether the purchase price is high or low. Utilizing the details given in the previous example, the present value is calculated.

$$P_0 = \frac{3.5}{1+0.20} + \frac{421}{1+0.20} = 2.92 + 350.83$$
$$= 353.75$$

The price or the value of the stock would have to be ₹353.74. The present stock price ₹335 is very low and the investor can buy it.

The investor can also find out the anticipated selling price for the stock with his expected rate of return from holding the stock. His expected return is 20 per cent.

$$P_0 = \frac{D_1}{1+r} + \frac{P_1}{1+r}$$
$$₹335 = \frac{3.5}{1+.2} + \frac{P_1}{1+.2}$$
$$₹335 = 2.92 + \frac{P_1}{1.20}$$
$$335 - 2.92 = \frac{P_1}{1.2}$$
$$332.08 \times 1.2 = P_1$$
$$P_1 = 398.5$$

Multiple year holding period

It is easy to calculate the present value of the stock for a year. If the holding period is more than a year, a separate formula is applied to find out the present value of the share.

$$P_0 = \left[\sum_{n=1}^{N} \frac{[(e_0)d/e](1+g)^n}{(1+r)^n}\right] + \left[\frac{(P/E)[(e_0)(1+g)^{N+1}]}{(1+r)^N}\right]$$

g = annual expected growth in earnings, dividends and price.

e_0 = most recent earnings per share

d/e = dividend pay out

r = required rate of return

P/E = price-earnings ratio

N = holding period in years

Example 2.3

A research study has stated that the rate of return of ABC Company due to capital appreciation and dividend after making adjustment for the outflow of income is 16.27 per cent for the period 2006–11. Let us assume that the return would continue to grow at this rate for another four years. The recent dividend paid by the company to its stockholders is 40 per cent and the EPS on 10/2011 is ₹35 and P/E is 4.8. If an investor wants to buy and hold the ABC stock for another four years, what would be the ideal price if his required rate of return is 20 per cent? The price is ₹167 on 14.10.2011.

NOTES

Solution:

$$P_0 = \left[\sum_{n=1}^{N} \frac{[(e_0)d/e]\,(1+g)^n}{(1+r)^n}\right] + \left[\frac{(P/E)\,[(e_0)(1+g)^{N+1}]}{(1+r)^N}\right]$$

The expected growth rate g = 16.27

The most recent earnings per share e_0 = 35

$$\text{Dividend pay-out} = \frac{\text{dividend per share}}{\text{EPS}} = \frac{₹4}{35} = 11.43$$

Required rate of return = 20%

Price earnings ratio P/E = 4.8

Holding period in years N = 4

Step 1: $(e_0)\,(d/e) = 35 \times \frac{11.43}{100} = 4$

Step 2:

$$\left[\sum_{n=1}^{N} \frac{[(e_0)d/e]\,(1+g)^n}{(1+r)^n}\right]$$

$$= \frac{4\times(1.1627)^1}{(1+0.20)} + \frac{4\times(1.1627)^2}{(1+0.20)^2} + \frac{4\times(1.1627)^3}{(1+0.20)^3} + \frac{4\times(1.1627)^4}{(1+0.20)^4}$$

$$= \frac{4.6508}{1.2} + \frac{5.4074}{1.44} + \frac{6.2872}{1.728} + \frac{7.3102}{2.0736}$$

$$= 3.8756 + 3.7551 + 3.638 + 3.5253$$

The present value of the dividend stream = 14.792

Step 3:

$$= \left[\frac{(P/E)\,[(e_0)(1+g)^{N+1}]}{(1+r)^N}\right]$$

$$= \frac{4.8\times 35(1+0.1627)^5}{(1+0.2)^4}$$

$$= \frac{356.9830}{2.0736}$$

= ₹172.156

Step 4:

$$P_0 = \left[\sum_{n=1}^{N} \frac{[(e_0)d/e]\,(1+g)^n}{(1+r)^n}\right] + \left[\frac{(P/E)\,[(e_0)(1+g)^{N+1}]}{(1+r)^N}\right]$$

= ₹14.7934 + 172.156

= ₹186.95

The expected present value of the ABC company stock is ₹186.95. Compared to it, the prevailing price, ₹167 is low. According to the present value approach the share can be bought.

NOTES

Case Study

Smart Tyres and Brisk Tyres companies' shares are presently sold at ₹60 and ₹100 respectively. Annual dividends over the next year are expected to be ₹1.5 and ₹2.5 respectively. Smart's projected earnings per share is ₹2.5 and Brisks - ₹4. Smart's dividends are expected to grow at 10 per cent per annum in the future and Brisk's by 9 per cent. Financial analysts have estimated the likely prices for the year ahead on two stocks to be ₹66, ₹72, ₹75 for Smart, and ₹114, ₹126, ₹132 for Brisk.

(a) You are asked to examine the return of each company's stock. Choose one stock to be purchased for a holding period of one year. Support your choice.

(b) If the investor's required rate of return is 15 per cent and he wants to hold the stock for a longer period, which stock would you suggest? Why?

Case Analysis

(a) The analysis can begin with the finding of the expected average return at the end of the holding period. Since the probability of occurrence of expected price is not given, equal probabilities can be assumed i.e. 33.33 of occurrence for each price.

$$\text{Expected Price} = R_1\, p_1 + R_2\, .P_2 + R_3\, .P_3$$

$$\text{Smart's expected price } P_t = 66 \times 0.333 + 72 \times 0.333 + 75 \times 0.333$$
$$= ₹71$$

$$\text{Brisk's expected price } P_t = 114 \times 0.333 + 126 \times 0.333 + 132 \times 0.333$$
$$= ₹124$$

One year holding period return is

$$E(r) = \frac{P_t - P_o + D}{P_o} \times 100$$

$$\text{Smart's } E(r) = \frac{71 - 60 + 1.5}{60} \times 100 = 20.833\%$$

$$\text{Brisk's } E(r) = \frac{124 - 100 + 2.5}{100} \times 100 = 26.5\%$$

The capital appreciation of the Brisk's share in the holding period is higher than the Smart's share.

(b) The growth is assumed for the foreseeable future; hence the constant growth model can be adopted for finding out whether the share is overvalued or undervalued.

$$P_0 = \frac{D}{r - g}$$

$$\text{Smart's } P_0 = \frac{1.5}{0.12 - 0.10} = ₹75$$

$$\text{Brisk's } P_0 = \frac{2.5}{0.12 - .09} = ₹83.33$$

The Smart's present price in lower than the theoretical price and the stock is undervalued i.e. 60 < 75 . It is better to buy Smarts share than the Brisks share in which the theoretical price is lower than the prevailing price ₹100>83.33.

NOTES

2.3.2 Stock or Share Valuation: Constant Growth Model

In the constant growth model, the basic assumption is that dividends will grow at the same rate (g) into an indefinite future.

$$P_0 = \frac{D(1+g)}{1+r} + \frac{D(1+g)^2}{(1+r)^2} + \frac{D(1+g)^3}{(1+r)^3} + \ldots + \frac{D(1+g)^N}{(1+r)^n}$$

When the period approaches to infinity, the equation takes the following form:

$$P_0 = \frac{D_1}{r-g}$$

P_0 = Present value of the stock

r = Required rate of return

g = The growth rate

D_1 = The next year dividend

This model is based on the assumption:

(a) The firm's dividend policy will be stable.

(b) The firm will earn a stable return over the time.

Some authors use the term "k" instead of "r". This model is applicable when the analyst is able to predict all the three variables in the equation, namely (i) next year's dividend, (ii) the firm's long term growth rate and (iii) the required rate of return of the investor. Once the three values are known to the analyst, the theoretical value or the present value of the stock can be computed and compared with the prevailing price.

If

(i) Theoretical value > Actual price → buy

(ii) Theoretical value < Actual price → sell

Another advantage of this model is that with the present selling price, next year's dividend and growth rate, the rate of return of the stock can be estimated.

(i) Present rate of return > Required rate of return → buy

(ii) Present rate of return < Required rate of return → sell

Consider the following examples:

Example 2.4

The company ABC's next year dividend per share is expected to be ₹3.50. The dividend in subsequent years is expected to grow at a rate of 10 per cent per year. If the required rate of return is 15 per cent per year, what should be its price? The prevailing market price is ₹75.

Solution:

$$P_0 = \frac{D_1}{r-g} \text{ or } \frac{D_1}{k-g}$$

D_1 = 3.50

r = 0.15

g = 0.10

$$= \frac{3.5}{.05}$$

$$= ₹70$$

NOTES

The investor would be willing to pay ₹70 for the share. Since the theoretical price is less than the market price, the investor is advised not to buy.

Example 2.5

Anil estimates that from investment on stock 'A' he would get 15 per cent dividend next year. It would continue to grow by 10 per cent for the rest of the years. The selling price is ₹40. He needs a return of 20 per cent per year for his son's educational expenses. Can he invest on stock 'A'?

Solution:

$$r = \frac{D_1}{P} + g$$

$$r = \frac{.15}{40} + .10$$

$$= .00375 + .1$$

$$r = .10375$$

$$r = .10375 \times 100$$

$$r = 10.37\%$$

The rate of return from the investment on stock 'A' would be only 10.37 per cent. Since Anil needs 20 per cent return, he should not invest in this stock. He should look for an alternate investment.

2.3.3 Stock or Share Valuation: Two-Stage Growth Model

The constant growth model is extended to two-stage growth model. Here, the growth stages are divided into two, namely, a period of extraordinary growth (or decline) and a constant growth period of infinite nature. The extra ordinary growth period will continue for some period followed by the constant growth rate. The information technology industry, for example, is at present experiencing an extraordinary growth rate. It may continue for sometime and afterwards it may maintain constant growth rate.

$$\text{The present value of the stock or price} = \frac{\text{Present value of the dividend during the above normal growth period}}{\text{Present value of stock price at the end of the above normal growth period}}$$

$$P_0 = \sum_{t=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t} + \frac{D_{N+1}}{(r_s - g_n)} \times \frac{1}{(1+r_s)^N}$$

D_0 = Dividend of the previous period

g_s = Above normal growth rate

g_n = Normal growth rate

r_s = Required rate of return

N = Period of above-normal growth

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Example 2.6

According to the Financial Express report, October 2011, the rate of return of Nagarjuna Fertilizer stock for the past five years is 18.58 per cent. This is assumed to continue for the next five years and after that rate of return is assumed to have a growth rate of 10 per cent indefinitely. The dividend paid for the year 2010-11 is 18 per cent. The required rate of return is 20 per cent. The price is ₹14 on 14.10.2011. Estimate the stock price according to the two-stage model.

Solution:

$$P_0 = \sum_{t=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t} + \frac{D_{N+1}}{(r_s - g_n)} \times \frac{1}{(1+r_s)^N}$$

D_0 = ₹1.80

g_s = 18.58% or 0.1858

g_n = 10% or 0.10

r_s = 20% or 0.2

N = 5 years

Step 1:

$$= \sum_{t=1}^{N} \frac{D_o(1+g_s)^t}{(1+r_s)^t}$$

$$= \frac{1.8(1.1858)^1}{(1+0.2)^1} + \frac{1.8(1.1858)^2}{(1+0.2)^2} + \frac{1.8(1.1858)^3}{(1+0.2)^3} + \frac{1.8(1.1858)^4}{(1+0.2)^4} + \frac{1.8(1.1858)^5}{(1+0.2)^5}$$

$$= \frac{2.1344}{1.2} + \frac{2.531}{1.44} + \frac{3.0013}{1.728} + \frac{3.5589}{2.0736} + \frac{4.2201}{2.488}$$

= 1.779 + 1.758 + 1.737 + 1.716 + 1.696

= 8.686

Step 2:

$$= \frac{D_{n+1}}{(r_s - g_n)}$$

= D_{N+1} is the fifth year's dividend growing at 10% rate

D_{N+1} = ₹4.2201 × 1.10

D_{N+1} = ₹4.642

$$\frac{D_{n+1}}{r_s - g_n} = \frac{4.642}{0.2 - 0.1}$$

= 46.42

Step 3:

$$= \frac{D_{n+1}}{(r_s - g_n)} \times \frac{1}{(1+r_s)^N}$$

$$= \frac{46.42}{2.488}$$

= ₹18.6575

NOTES

Step 4:

$$P_0 = \sum_{t=1}^{N}\frac{D_o(1+g_s)^t}{(1+r_s)^t}+\frac{D_{N+1}}{(r_s-g_n)}\times\frac{1}{(1+r_s)^N}$$

$= ₹8.686 + 18.6575$

$= ₹27.34$

The computed value, ₹27.34 is higher than the market price, ₹14.

2.3.4 Stock or Share Valuation: Three-Phase Model

In the three-phase model, three phases of dividend growth pattern are assumed. Dividends are assumed to grow at a constant rate 'g_a' for a period of 'A' years. After the phase 'A,' the growth rate of dividend declines for A + 1 years throughout the phase B and the decline in the dividend rate would be linear. Afterwards, there would be perpetual growth rate 'g_n'. Some times the 'g_a' would be less than 'g_n,' and in the second phase there would be linear growth rate. The perpetual growth rate is known as the firms long run normal growth rate. Figure 2.1 illustrates the three-stage growth rates.

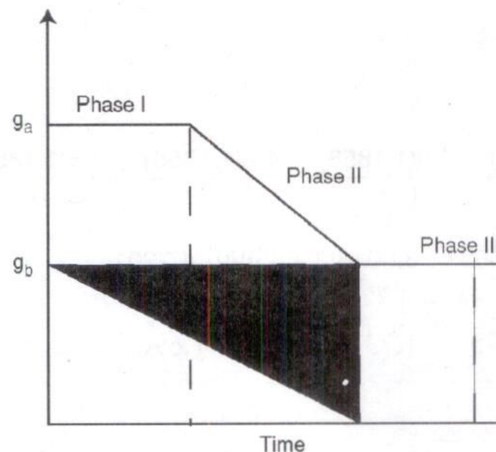


Fig. 2.1 Three-Phase Model of Stock Return and Valuation

$$P_0 = \sum_{t=1}^{A}\frac{D_o(1+g_a)^t}{(1+r)^t}+\sum_{t=A+1}^{B}\frac{D_{t-1}(1+g_b)}{(1+r)^t}+\frac{D_B(1+g_n)}{r-g_n(1+r)^B}$$

D_o = The next year dividend

g_a = The period 'A' growth rate

g_b = The period 'B' growth rate

g_n = The growth rate in the third phase

D_B = The dividend at the beginning of the third phase

Consider the following example:

Example 2.7

For the first four years, XYZ firm is assumed to grow at a rate of 10 per cent. After four years the growth rate of dividend is assumed to decline linearly to 6 per cent. After 7 years, the firm is assumed to grow at a rate of 6 per cent infinitely. The next year dividend is ₹2 and the required rate of return is 14 per cent. Find out the value of the stock.

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Solution:

$$P_0 = \sum_{t=1}^{A} \frac{D_o(1+g_a)^t}{(1+r)^t} + \sum_{t=A+1}^{B} \frac{D_{t-1}(1+g_b)}{(1+r)^t} + \frac{D_B(1+g_n)}{r-g_n(1+r)^B}$$

$D_o = 2$

$r = 0.14$

$g_a = 0.1$

D_b = declining rate of return from 10% to 6% i.e. 0.09, 0.08, 0.07, 0.06

$g_n = 0.06$

B = 7 years (the beginning of the III phase)

Step 1:

$$= \sum_{t=1}^{A} \frac{D_o(1+g_a)^t}{(1+r)^t}$$

$$= \frac{2}{(1.14)} + \frac{2(1.1)}{(1.14)^2} + \frac{2(1.1)^2}{(1.14)^3} + \frac{2(1.1)^3}{(1.14)^4}$$

= 1.754+1.693+1.633+1.576

= ₹6.656

Step 2:

$$= \sum_{t=A+1}^{B} \frac{D_{t-1}(1+g_b)}{(1+r)^t}$$

$$= \frac{2(1.1)^3\,(1.09)}{(1.14)^5} + \frac{2(1.1)^3\,(1.09)\,(1.08)}{(1.14)^6} + \frac{2(1.1)^3\,(1.09)\,(1.08)\,(1.07)}{(1.14)^7}$$

= ₹4.2746

Step 3:

$$= \frac{D_B(1+g_n)}{(r-g_n)\,(1+r)^B}$$

$$= \frac{2(1.1)^3\,(1.09)\,(1.08)\,(1.07)\,(1.06)}{(0.14-0.06)\times 2.5023}$$

$$= \frac{3.554}{.2001}$$

= ₹17.7611

Step 4:

Add all the components of the equation

P_0 = ₹ 6.656 + 4.2746 + 17.7611

P_0 = ₹ 28.69

The present value of the stock is ₹ 28.69.

The value of the stock can be compared with the actual price to take a decision on the purchase, sale or hold the stock. Alternate way to employ this model is to find out the return by equating P_o to the actual price, without giving the required rate. By

NOTES

solving the equation, the rate of return could be found. This rate can be compared with the investor's expected rate of return and proper decision can be made.

We have moved from constant growth model to two-phase growth model and three-phase model; with each model the number of variables and complexity of computation have increased. If growth models are oversimplified, inadequate information would be provided by the forecasts. If they are too complex, the results or the forecasts made by the computation are likely to be inaccurate. Hence, the analyst has to trade off between manageability and accuracy. Estimating year-by-year growth rate into an infinite future is quite impossible. At the same time, giving a single average growth rate for the future is not fully dependable. The analyst has to strike a balance between the complexity and manageability of the known information for forecasting the value of the stock.

Exhibit 2.1

The Economic Times

Companies cash in on valuation dip, rush to buy back shares

MUMBAI: The fag end of 2011 has seen quite a few companies rushing in with buy-back plans after their valuations slipped significantly on the bourses.

In the past three weeks, five companies announced plans to purchase shares from the open market, triggering some momentum in their beaten-down shares. The move provided some relief to shareholders whose wealth has eroded significantly amid choppy market since January.

'The companies planning buy-backs must be having enough surplus cash which they do not want to deploy immediately in any project. It makes sense to buy-back shares in the current market as valuations are quite attractive," said G.S. Ganesh, founder president, Inga Capital, a category-I merchant banker.

These companies include Indiabulls Real Estate, Monnet Ispat & Energy and Praj Inds are the three notable companies that figure in the list. They are planning to spend 450 crore, 100 crore and 56 crore, respectively, on their respective buy-back programmes.

Merchant bankers and brokers feel attractive valuations have been prompting many companies to rush with buy-back offers in the current market. The stocks of the five companies are quoting at a discount ranging from 21% to 64% to their respectively 52-week high prices. The discount, in fact, has narrowed as most of these shares rose substantially in the past few days amid the buy-back announcements.

Buy-back of shares acts as cushion to the price in a falling market. It helps promoters increase their holding and that too without making any fresh acquisitions in the open market.

Under a buy-back programme, a company repurchases shares from the open market or through the tender offer. The repurchased shares are extinguished subsequently, reducing the paid-up capital to that extent. Buy back of shares, however, are subject to certain rules and regulations. A company cannot buy back more than 25% of the paid-up capital and not more than 25% of its net worth can be utilised for the same. Also, the debt-equity ratio should not be more than 2:1 after buyback.

Source: http://economictimes.indiatimes.com/markets/stocks/stocks-in-news/companies-cash-in-on-valuation-dip-rush-to-buy-back-shares/articleshow/11298535.cms

Assessed on 30 December 2011.

2.3.5 Stock or Share Valuation: Price-Earning (P/E) Ratio Analysis

Price-earning (P/E) ratios are used to estimate the value of the stocks by the investors rather than adopting the discounting models. Every financial magazine and the newspaper at regular intervals publish price earnings per share. The P/E ratio models have three distinct advantages over the discounting models.

1. P/E ratio indicates price per rupee of share earnings. This would help to compare the prices of stocks, which have different earnings per share.
2. P/E ratios are helpful in analysing the stocks of the companies that do not pay dividend but have earnings. It should be noted that when there is a loss, the P/E ratio analysis is difficult to use.
3. The variables used in P/E ratio models are easier to estimate than the variables in the discounting model.

With the P/E ratio models, the investor can only find the relative positions of the different stocks. It does not indicate what price is appropriate for a particular stock. For **example** from the P/E ratio, the analyst can state that P/E ratio of Kinetic Honda 27.5 (in October 2011) is higher than that of Bajaj Auto-(17.2) and T.V.S. Suzuki Ltd.-(18.1).

Concept

The conceptual framework of the P/E ratio arises from the constant growth model. The constant growth model can easily be written in price-earnings model.

$$P = \frac{d}{r - g}$$

Dividing both the sides with E, we have:

$$P/E = \frac{d/e}{r - g}$$

d/e is the pay out ratio. Now the P/E ratio is the function of the payout ratio, the discount rate and the growth rate. The factors involved in the formula indicate that higher the payout ratio, the higher is the price earning multiples keeping other things, i.e., r and g constant. If the growth rate is high, then also the P/E ratio would be high. If the discount rate or the required rate of return is high, the value of the P/E ratio would be low and vice versa.

If the growth rate is taken to be depending on the return on equity (ROE), then

$g = ROE\,(1 - d/e)$; d/e – payout ratio then

$$P = \frac{d}{r - g}$$

can be written as

$$P/E = \frac{d/e}{r - ROE\,(1 - d/e)}$$

Thus, P/E ratio depends on the dividend payout, discount rate and return on equity. All these factors affect the price earning multiples.

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2.3.6 Stock or Share Valuation: Whitbeck Kisor Model

The P/E ratio can be related to concerned variables by using the multiple regression technique. Whitbeck Kisor has developed the following model.

P/E = f(growth rate of earnings g, dividend payment rate D/E, risk in the growth rate σ)

The relationship between P/E and the above mentioned variables on 135 stocks. The results are given as follows.

$$P/E = 8.2 + 1.5\ g + 0.067\ D/E - 0.2\sigma$$

This equation indicates the impact of all the three variables on the P/E ratio and consistent with the earlier model

$$P/E = \frac{d/e}{r-g}$$

All the three variables in the multiple regression are associated with the afore mentioned equation. The coefficients of the equation indicate the weights of the variables on the P/E ratio. The signs show the direction of impact of the particular variable on the P/E ratio. One per cent increase in the standard deviation of growth rate would cause 0.2 unit decrease in the P/E ratio. Further, the equation indicates that 1 per cent increase in earnings' growth would cause 1.5 unit increase in the P/E ratio. One per cent increase in dividend payout ratio would result in 1.5 unit increase in the P/E ratio. Thus, the equation indicates higher growth, higher dividends and lower risk would lead to high P/E ratio and vice versa. With the help of the Whitbeck Kisor model, the analyst can calculate the theoretical value of the P/E ratio and compare it with actual value. If,

(i) Theoretical P/E > actual P/E $\rightarrow$ Sell

(ii) Theoretical P/E < actual P/E $\rightarrow$ Buy

The model is sample sensitive. The coefficients of the particular period and sample may not give correct estimation of P/E for another period.

Consider the following example:

Example 2.8

Company 'A's stock growth rate is 15 per cent, its dividends pay out ratio is 40 per cent and its standard deviation in the growth rate is 5 per cent. The value of the current P/E ratio is 22.5 per cent. On the basis of Whitbeck Kisor's model, what is your advice?

Solution:

Theoretical P/E = 8.2 + 1.5g + .067 d/e – 2σ

The values have to be substituted

$$\begin{aligned} P/E &= 8.2 + 1.5\ (15) + .067\ (40) - .2\ (5) \\ &= 8.2 + 22.5 + 2.68 - 1 \\ &= 33.38 - 1 \\ &= 32.38. \end{aligned}$$

Advice: Since the actual value of the P/E ratio is below the theoretical value, the stock can be sold.

2.3.7 Preferred Stock or Share Valuation

Preferred stocks provide a fixed income return; hence, the equation adopted to find out the value is as follows:

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$$P_o = \frac{D}{r}$$

D = The dividend paid

r = Required rate of return.

Suppose a preferred stock's annual dividend is ₹4 and the required rate of return is 10 per cent what is it worth today?

$$P_o = \frac{D}{r} = \frac{4}{0.10} = ₹40$$

If the market price is given, it is easier to find out the rate of return of the preferred stock. Suppose ₹6 dividend paying preferred stock is selling in the market for ₹50, the yield or return also can be found out.

$$P_0 = \frac{D}{r}$$

$$50 = \frac{6}{r}$$

$$\therefore \quad r = 0.12$$

Thus, with the given value of dividend and the market price, the return can be found.

2.3.8 Portfolio Return

Portfolio return is the weighted return of the returns of the different investments forming the portfolio. (For details refer Unit 4).

2.4 RISK ANALYSIS: CONCEPTS, TYPES, MEASURES AND COMPUTATION OF INDIVIDUAL SECURITY AND PORTFOLIO

You have already read about the definition of risk in section 2.2. Risk consists of two components, systematic risk and unsystematic risk. Systematic risk is caused by factors external to the particular company and uncontrollable by the company. It affects the market as a whole. In the case of unsystematic risk, the factors are specific, unique and related to the particular industry or company.

2.4.1 Measures and Computation of Systematic Risk

Systematic risk affects the entire market. Often we read in the newspaper that the stock market is grappling in the a bear hug or a bull grip. This indicates that the entire market is moving in a particular direction, either downward or upward. Economic conditions, political situations and sociological changes affect the security market. The recession in the economy affects the profit prospect of the industry and the stock market. The 1998 recession experienced by developed and developing countries has affected the stock markets all over the world. The South East Asian crisis has affected stock market worldwide. There the factors are beyond the control of the corporate

Check Your Progress

3. How are the historical or ex-post returns derived?
4. Which mathematical function is used in the calculation of ex-ante or future returns?
5. List the factors that determine the P/E ratio.

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Market risk: Market risk as that portion of total variability of return caused by the alternating forces of bull and bear markets

and the investor. They cannot be entirely avoided by the investor. It drives home the point that systematic risk is unavoidable.

Systematic risk is further sub-divided into three parts:

1. Market risk
2. Interest rate risk
3. Purchasing power risk

1. Market risk

Jack Clark Francis in his Journal 'Statistical Analysis of Risk Surrogates for NYSE stocks', journal of financial and quantitative analysis, Vol 14 (5): 981-997: has defined **market risk** as that portion of total variability of return caused by the alternating forces of bull and bear markets. When the security index moves upward haltingly for a significant period of time, it is known as bull market. In the bull market, the index moves from a low level to the peak. Bear market is just a reverse to the bull market; the index declines haltingly from the peak to a market low point called trough for a significant period of time. During the bull and bear market more than 80 per cent of the securities' prices rise or fall along with the stock market indices.

The forces that affect the stock market are tangible and intangible events. The tangible events are real events such as earthquake, war, political uncertainty and fall in the value of currency.

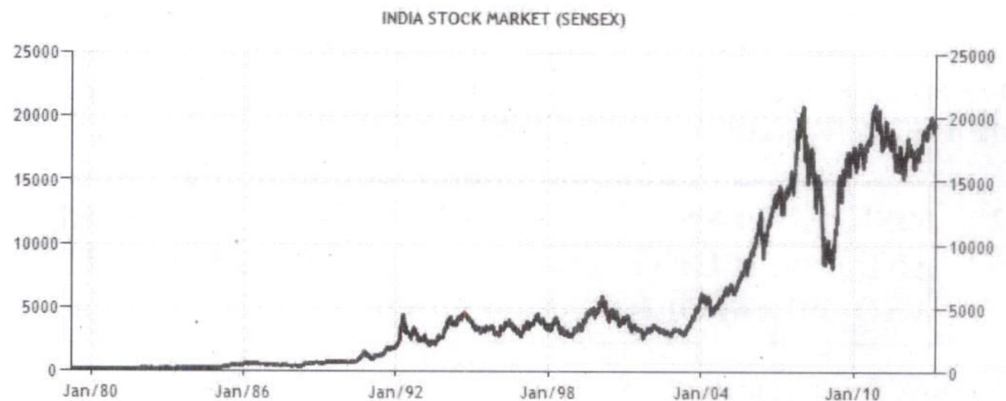


Fig. 2.2 *Sensex Trend since Inception of the Series (1979) to 2013*

Source: *http://www.tradingeconomics.com/india/stock-market- 18th March, 2013.*

SENSEX is the stock price index of the country computed and widely used since inception 1979. First discernible bull-trend prevailed in early 1992, after 12 years of inception of the SENSEX series, only to be punctured by the Harshad Mehta scam. Next bull trend took another 12 years from May 2004. The run lasted for about 4 years to be punctured by American Melt down. But resilience of Indian stock market was quick and as of March 2013 sensex hovers around 20000 points or so.

It was on 8 January, 2008 when the SENSEX touched an all time peak of 21078 before closing at 20873. The biggest crash in the history of Indian stock market was on 18 May, 2009 when the SENSEX increased by 2110.79 points from the previous closing of 12174.42. This led to the suspension of trade for the whole day. The reason was due to the victory of the UPA in the 15^{th} general elections. Trading

was open for that day only for 55 seconds. Initially, in 25-30 seconds of opening the market reached upper freeze limit twice in that day itself.

Thus, any untoward political or economic event would lead to a fall in the price of the security which would be further accentuated by the over-reactions and the herd-like behaviour of the investors. If some financial institutions start disposing the stocks, the fear grips in and spreads to other investors. This results in a rush to sell the stocks. The actions of the financial institutions would have a snowballing effect. This type of over-reaction affects the market adversely and the prices of the scrips' fall below their intrinsic values. This is beyond the control of the corporate.

2. Interest Rate Risk

Interest rate risk is the variation in the single period rates of return caused by the fluctuations in the market interest rate. Most commonly, interest rate risk affects the price of bonds, debentures and stocks. The fluctuations in the interest rates are caused by changes in the government monetary policy and changes that occur in the interest rates of treasury bills and the government bonds. The bonds issued by the government and quasi-government are considered to be risk free. If higher interest rates are offered, investor would like to switch his investments from private sector bonds to public sector bonds. If the government to tide over the deficit in the budget floats a new loan/bond of a higher rate of interest, there would be a definite shift in the funds from low yielding bonds to high yielding bonds and from stocks to bonds.

Likewise, if the stock market is in a depressed condition, investors would like to shift their money to the bond market to have an assured rate of return. The best example is that in April 1996, most of the initial public offerings of many companies remained undersubscribed but IDBI and IFC bonds were oversubscribed. The assured rate of return attracted the investors from the stock market to the bond market.

The rise or fall in the interest rate affects the cost of borrowing. When the call money market rate changes, it affects the badla rate too. Most stock traders trade in the stock market with the borrowed funds. The increase in the cost of margin affects the profitability of the traders. This would dampen the spirit of the speculative traders who use the borrowed funds. The fall in the demand for securities would lead to a fall in the value of the stock index.

Interest rates not only affect the security traders but also the corporate bodies who carry their business with borrowed funds. The cost of borrowing would increase and a heavy outflow of profit would take place in the form of interest to the capital borrowed. This would lead to a reduction in earnings per share and a consequent fall in the price of share.

3. Purchasing power risk

Variations in the returns are caused also by the loss of purchasing power of currency. Inflation is the reason behind the loss of purchasing power. The level of inflation proceeds faster than the increase in capital value. Purchasing power risk is the probable loss in the purchasing power of the returns to be received. The rise in price penalises the returns to the investor and every potential rise in price is a risk to the investor.

Inflation may be demand-pull or cost-push in nature. In the demand pull inflation, the demand for goods and services are in excess of their supply. At full employment

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Interest rate risk: Interest rate risk is the variation in the single period rates of return caused by the fluctuations in the market interest rate

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level of factors of production, the economy would not be able to supply more goods in the short run and the demand for products pushes the price upward. The supply cannot be increased unless there is an expansion of labour force or machinery for production. The equilibrium between demand and supply is attained at a higher price level.

Cost-push inflation, as the name itself indicates, is inflation or rise in price caused by an increase in cost. The increase in the cost of raw material, labour and equipment makes the cost of production high and ends in high price level. The producer tries to pass the higher cost of production to the consumer. Labourers or the working force try to make the corporate to share the increase in the cost of living by demanding higher wages. Thus, the cost push inflation has a spiralling effect on price level.

The changes in the price levels are measured by the consumer price index for industrial workers. This index uses a basket of goods used by the industrial labourers in different parts of India. Wholesale price index is also used to measure the inflation. The annual rate of inflation in terms of consumer price index of industrial workers and wholesale price index are given in Table 2.1.

Table 2.1 *Main Inflation Indicators*

Years	WPI	CPI-IW
1997–98	4.4	6.8
1998–99	5.9	13.1
1999–00	3.3	3.4
2000–01	7.2	3.8
2001–02	3.6	4.3
2002–03	3.4	4.0
2007-08	4.7	6.2
2008-09	8.4	9.1
2010-11	9.56	10.45
2011-12	8.94	8.34
2012-13	7.55	10.00

(*Source*: RBI Bulletin)

Table 2.1 indicates the rate of growth of inflation in the Indian economy. The real return of any investment could be calculated by using the following equation:

$$\text{Real future value} = \frac{\text{Nominal future value}}{1.0 + \text{Inflation Rate (IR)}}$$

$$\text{RIR} = \frac{\text{NIR} - \text{I}}{\text{I}} \times 100$$

Where:

RIR = Real Interst Rate

NIR = Nominal Interest Rate effect on initial investment

I = Inflationary effect on initial investment

For example, if an investor gets a return of 12% on his investment and the inflation rate is 6.8%, then the real value would be

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$$\text{Real Rate of Return} = \frac{1.0 + r}{1.0 + IR} - 1.0$$

$$= \frac{1.0 + .12}{1.0 + 0.068} - 1$$

$$= 1.0486 - 1 = .0486 = 4.86\%$$

The example shows that his actual rate of return is only 4.86%. The purchasing power has not increased by 12% according to his earnings. If, he really wants to protect himself from the inflation and earn a 12% real rate of return, then his rate of return should be 19.6 per cent.

$$RR = \frac{1.0 + r}{1.0 + IR} - 1$$

$$0.12 + 1 = \frac{1 + r}{1.0 + 0.68}$$

$$= 1.1961 - 1 = .196 = 19.6\%$$

If the investor has earned 5% return from his investment in stocks, even though it gives an illusion of earning, his earning is actually negative. The following calculation explains it.

$$RR = \frac{1.0 + r}{1.0 + IR} - 1$$

$$= \frac{1.0 + .05}{1.068} - 1 = -.0169 = -1.69\%$$

The investor's income has increased by 5% but his real rate of return has declined by 1.69 per cent. His investment has a negative real rate of return. Thus, the changes that occur in the purchasing power also cause variations in the expected return and the actual return. To tide over the purchasing power risk, the investor should try to ensure that the nominal rate of return is greater than the inflation rate prevailing in the economy. Thus, purchasing power risk affects returns from bonds, debentures and stocks.

2.4.2 Measures and Computation of Unsystematic Risk

As already mentioned, unsystematic risk is unique and peculiar to a firm or an industry. It stems from managerial inefficiency, technological change in the production process, availability of raw material, changes in the consumer preference and labour problems. The nature and magnitude of these factors differ from industry to industry, and company to company. They have to be analysed separately for each industry and firm. Changes in the consumer preference affect consumer products like television sets, washing machines, refrigerators more than they affect the iron and steel industry. Technological changes affect the information technology industry more than that of consumer product industry. Thus, it differs from industry to industry. Financial leverage of the companies that is debt-equity portion of the companies differs from each other. The nature and mode of raising finance and paying back the loans involve a risk element. All these factors form unsystematic risk and contribute a portion in the total variability of the return. Broadly, unsystematic risk can be classified into two sub-heading:

1. Business risk
2. Financial risk

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Business risk:
Business risk is that portion of the unsystematic risk caused by the operating environment of the business.

1. Business risk

Business risk is that portion of the unsystematic risk caused by the operating environment of the business. Business risk arises from the inability of a firm to maintain its competitive edge and the growth or stability of the earnings. Variation that occurs in the operating environment is reflected on the operating income and expected dividends. The variation in the expected operating income indicates the business risk. Consider two companies—Anu and Vinu companies. In Anu company, operating income could grow as much as 15 per cent and as low as 7 per cent. In Vinu company, the operating income can be either 12 per cent or 9 per cent. When both the companies are compared, Anu company's business risk is higher because of its high variability in operating income compared to Vinu company. Thus, business risk is concerned with the difference between revenue and earnings before interest and tax. Business risk can be divided into external business risk and internal business risk.

(i) Internal business risk

Internal business risk is associated with the operational efficiency of the firm. The operational efficiency differs from company to company. The efficiency of operation is reflected on the company's achievement of its pre-set goals and the fulfillment of the promises to its investors.

- **Fluctuations in sales:** Sales level has to be maintained. It is common in business to lose customers abruptly because of competition. Loss of customers will lead to a loss in operational income. Hence, the company has to build a wide customer base through various distribution channels. Diversifed sales force may help to tide over this problem. Big corporate bodies have long chain of distribution channel. Small firms often lack this diversified customer base.
- **Research and development (R&D):** Sometimes the product may go out of style or become obsolescent. It is the management that has to overcome the problem of obsolescence by concentrating on the in-house research and development program. For **example**, if Maruti Udyog has to survive the competition, it has to keep its Research and Development section active and introduce consumer oriented technological changes in the automobile sector. This is often carried out by introducing sleekness, seating comfort and break efficiency in their automobiles. New products have to be produced to replace the old one. Reducing R&D budget for short term advantage would be perilous for a company whose survival depends on then products remaining continually competitive.
- **Personnel management:** Personnel management of the company also contributes to the operational efficiency of the firm. Frequent strikes and lock outs result in loss of production and high fixed capital cost. The labour productivity also would suffer. The risk of labour management is present in all the firms. It is up to the company to solve the problems at the table level and provide adequate incentives to encourage the increase in labour productivity. Encouragement given to the labourers at the floor level would boost morale of the labour force and leads to higher productivity and less wastage of raw materials and time.
- **Fixed cost:** Cost components also generate internal risk if the fixed cost is higher in the cost component. During the period of recession or low demand for

product, the company cannot reduce the fixed cost. At the same time in the boom period also the fixed factor cannot vary immediately. Thus, the high fixed cost component in a firm would become a burden to the firm. The fixed cost component has to be kept always in a reasonable size, so that it may not affect the profitability of the company.

- **Single product:** The internal business risk is higher in the case of a firm producing a single product. The fall in the demand for a single product would be fatal for the firm. Further, some products are more vulnerable to the business cycle while some products resist and grow against the tide. Hence, the company has to diversify the products if it has to face the competition and the business cycle successfully. Consider for instance, Hindustan Lever Ltd., which produces a wide range of cosmetics has been thriving in business. Even in diversification, diversifying the product in the unknown path of the company may lead to an internal risk. Unwieldy diversification is as dangerous as producing a single good.

(ii) External business risk

External risk is the result of operating conditions imposed on the firm by circumstances beyond its control. The external environments in which it operates exert some pressure on the firm. The external factors are social and regulatory factors, monetary and fiscal policies of the government, business cycle and the general economic environment within which a firm or an industry operates. Government can promote a particular industry by giving tax holiday or by other initiatives. As a consequence, the stock price of that industry will increase. For instance, the sugar and fertilizer industry in India depend on external factors.

- **Social and regulatory factors:** Harsh regulatory climate and legislation against the environmental degradation may impair the profitability of the industry. Price control, volume control, import/export control and environment control reduce the profitability of the firm. This risk is more in industries related to public utility sectors such as telecom, banking and transportation. The governments' tariff policy of the telecom sector has a direct bearing on its earnings. Likewise, the interest rates and the directions given in the lending policies affect the profitability of the banks. CESC has not been able to increase its power tariff due to the stiff resistance by the West Bengal government. The Pollution Control Board has asked to close most of the tanneries in Tamil Nadu, which has affected the leather industry.
- **Political risk:** Political risk arises out of the change in the government policy. With a change in the ruling party, the policy also changes. When Manmohan Singh was the finance minister, liberalization policy was introduced. During the Bharathiya Janata Party government tenure, even though efforts were taken to augment the foreign investment, more stress was given to Swadeshi. Political risk arises mainly in the case of foreign investment. The host government may change its rules and regulations regarding the foreign investment. From the past, an example can be cited. In 1977, the government decided that the multinationals must dilute their equity and share their growth with the Indian investors. This forced many multinationals to liquidate their holdings in the Indian companies.
- **Business cycle:** The fluctuations of the business cycle lead to fluctuations in the earnings of the company. Recession in the economy leads to a drop in the

output of many industries. Steel and white consumer goods industries tend to move in tandem with the business cycle. During the boom period, there would be hectic demand for steel products and white consumer goods. But at the same time, they would be hit much during the recession period. At present, the information technology industry has resisted the business cycle and moved counter cyclically during the recession period. The effects of the business cycle vary from one company to another. Sometimes, companies with inadequate capital and consumer base may be forced to close down. In some other case, there may be a fall in the profit and the growth rate may decline. This risk factor is external to the corporate bodies and they may not be able to control it.

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Financial Risk:
Financial risk refers to the variability of the income to the equity capital due to the debt capital.

2. Financial Risk

Financial risk refers to the variability of the income to the equity capital due to the debt capital. Financial risk in a company is associated with the capital structure of the company. Capital structure of the company consists of equity funds and borrowed funds. The presence of debt and preference capital results in a commitment of paying interest or pre fixed rate of dividend. The residual income alone would be available to the equity holders. The interest payment affects the payments that are due to the equity investors. Debt financing increases the variability of the returns to the common stock holders and affects their expectations regarding the return. The use of debt with the owned funds to increase the return to the shareholders is known as financial leverage.

Debt financing enables a corporate to have funds at a low cost and low financial leverage to the shareholders. As long as the earnings of a company are higher than the cost of borrowed funds, shareholders' earnings are increased. At the same time when the earnings are low, it may lead to bankruptcy to equity holders. This can be illustrated with the help of the following example. Please note that no tax has been assumed in order to simplify the concept.

	Years		
	2006	2007	2008
Company A			
Equity Capital ₹10 per share	20,00,000	20,00,000	20,00,000
Debt fund (10% interest)	10,00,000	10,00,000	10,00,000
Operating income	3,00,000	40,00,00	20,00,00
Earnings per share	1	1.5	0.5
Company B			
Equity Capital ₹10 per share	10,00,000	10,00,000	10,00,000
Debt fund (10% interest)	20,00,000	20,00,000	20,00,000
Operating income	3,00,000	4,00,000	2,00,000
Earnings per share	1.0	2.0	Nil

This example deals with three different situations. In 2006, both the companies earned the same amount and the earnings per share were same. But, in 2007, there

was a 33.33 per cent hike in the earnings of the two companies. In company A, 33.33 per cent rise in operating income has resulted in a 50 per cent increase in earnings per share. In company B, the effect of increase in operating income is more. The earnings per share has increased by cent per cent i.e. from ₹1 to ₹2. This is because the bond holders receive only the fixed interest whether the company fared well or not. The increase in earnings per share would cause a change in the capital appreciation in the shares of company B during a good year.

In 2008, the economic climate has changed and there is a fall in the operating profit by 33.33 per cent for both the companies. This has caused 50 per cent fall in earnings per share for company A compared to 2006. But company B,s earnings per share has fallen to zero and the shareholders are affected adversly in the bad year. If we assume another situation of negative earnings, the situation would be worse in company B and the shareholders will be affected much. A few years of persistent negative earnings will erode the shareholders' equity. Fixed return on borrowed capital either enhances or reduces the return to shareholders.

The financial risk considers the difference between EBIT and EBT (earnings before tax). The business risk causes the variations between revenue and EBIT. Payment of interest affects the eventual earnings of the company stock. Thus, volatility in the rates of return on the stock is magnified by the borrowed money. The variations in income caused by the borrowed funds in highly levered firms are greater compared to the companies with low leverage. Financial leverage or financial risk is avoidable because it is the management that has to decide how much to funding must be equity capital how much should be borrowed capital.

2.4.3 Minimizing Risk Exposure

Every investor wants to guard himself from risk by understanding the nature of the risk and by planning carefully. The following sections give an agenda for protecting investors from the different types of risks.

1. Market risk protection

(i) The investor has to study the price behaviour of the stock. The stock that shows a growth pattern may continue to do so for some more period. The Indian stock market expects the growth pattern to continue for some more time in information technology stock and depressing conditions to continue in the textile related stock. Some stocks may be cyclical stocks and they are avoided better.

(ii) The standard deviation and beta indicate the volatility of the stock. The standard deviation and beta are available for the stocks that are included in the indices. The National Stock Exchange News bulletin provides this information. Looking at the beta values, the investor can gauge the risk factor and make wise decision according to his risk tolerance.

(iii) Further, the investor should be prepared to hold the stock for a period of time to reap the benefits of the rising trends in the market. He should be careful in the timings of the purchase and sale of the stock. He should purchase it at the lower level and sell at a higher level.

2. Protection against interest rate risk

(i) Often suggested solution for this is to hold the investment to maturity. If he sells it in the middle due to fall in the interest rate, the capital invested would experience a heavy loss.

(ii) The investors can also buy treasury bills and bonds of short maturity. The portfolio manager can invest in the treasury bills and the money can be reinvested in the market to suit the prevailing interest rate.

(iii) Another suggested solution is to invest in bonds with different maturity dates. When the bonds mature in different dates, reinvestment can be done according to the changes in the investment climate. Maturity diversification can yield the best results.

3. Protection against inflation

(i) The general opinion is that the bonds or debentures with fixed return cannot solve the problem. If the bond yield is 13 to 15 per cent with low risk factor, they would provide hedge against the inflation.

(ii) Another way to avoid the risk is to have investment in short-term securities and to avoid long-term investment. The rising consumer price index may wipe off the real rate of interest in the long term.

(iii) Investment diversification can also solve this problem to a certain extent. The investor has to diversify his investment in real estates, precious metals, arts and antiques along with the investment in securities. One cannot assure that different types of investments would provide a perfect hedge against inflation. It can minimize the loss due to the fall in the purchasing power.

4. Protection against business and financial risk

(i) To guard against business risks, the investor has to analyse the strength and weakness of the industry to which the company belongs. If weakness of the industry is too much of government interference in the way of rules and regulations, it is better to avoid it.

(ii) Analysing the profitability trend of the company is essential. The calculation of standard deviation would yield the variability of the return. If there is inconsistency in the earnings, it is better to avoid it. The investor has to choose a stock of consistent track record.

(iii) The financial risk should be minimized by analysing the capital structure of the company. If the debt equity ratio is higher, the investor should have a sense of caution. Along with the capital structure analysis, he should also take into account of the interest payment. In a boom period, the investor can select a highly levered company but not in a recession.

2.4.4 Risk Measurement

Understanding the nature of the risk is not adequate unless the investor or analyst is capable of expressing it in some quantitative terms. Expressing the risk of a stock in quantitative terms makes it comparable with other stocks. Measurements cannot be

assured of cent percent accuracy because risk is caused by social, political and economic factors and managerial efficiency. Measurement provides an approximate quantification of risk. The statistical tool often used to measure and used as a proxy for risk is standard deviation.

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Standard deviation:
It is a measure of the values of the variables around its mean or it is the square root of the sum of the squared deviations from the mean divided by the number of observances

Standard deviation

It is a measure of the values of the variables around its mean or it is the square root of the sum of the squared deviations from the mean divided by the number of observances. The arithmetic mean of the returns may be same for two companies but the returns may vary widely. This can be illustrated with an example.

Now let us take two companies A and B to calculate the expected returns.

Company A			Company B		
(r_i)	(P_i)	$(P_i)(r_i)$	(r_i)	(P_i)	$(P_i)(r_i)$
6	0.10	0.6	4	0.1	0.4
7	0.25	1.75	6	0.2	1.2
8	0.30	2.4	8	0.4	3.2
9	.25	2.25	10	0.2	2.0
10	.10	1.00	12	0.1	1.2
		$\sum E(r) = 8.00$			$\sum E(r) = 8.00$

In the example given here the expected means are the same in both the companies. Company A return varies from 6% to 10% while company B's return varies from 4% to 12%. To find out the variation, the standard deviation technique is applied.

$$\sigma = \sqrt{\sum_{i=1}^{N} P[r_i - E(r)]^2}$$

$$\text{Varience } (\sigma^2) = \sum_{i=1}^{n} P[r_i - E(r)]^2$$

$$\text{hence } \sigma = \sqrt{\text{Variance } (\sigma^2)}$$

For company A

r_i	P_i	r_i-E(r)	$[r_i - E(r)]^2$	$P_i[r_i - E(r)]^2$
6	0.10	−2	4	.4
7	0.25	−1	1	.25
8	0.30	0	0	0
9	0.25	+1	1	.25
10	0.10	+2	4	.40
				1.30

$$\sigma = \sqrt{\sum_{i=1}^{N} P[r_i - E(r)]^2}$$

$$\sigma = \sqrt{1.30} = 1.14$$

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Characteristic regression line (CRL):
Characteristic regression line (CRL) is a simple linear regression model estimated for a particular stock against the market index return to measure risks

For company B

r_i	P_i	r_i-E(r)	$[r_i - E(r)]^2$	$P_i[r_i$-E (r) $]^2$
4	0.1	–4	16	1.6
6	0.2	–2	4	.8
8	0.4	0	0	0
10	0.2	+2	4	.8
12	0.1	+4	16	1.6
				4.8

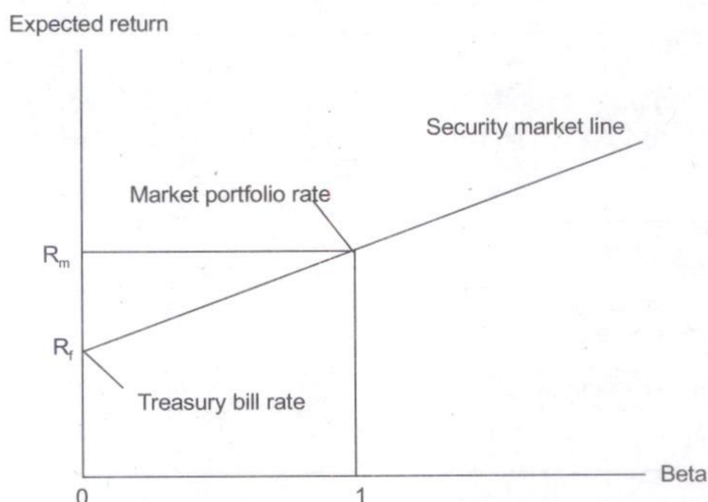
$$\sigma = \sqrt{\sum_{i=1}^{N} P_i \; [r_i - E(r)]^2}$$

$$\sigma = \sqrt{4.80} = 2.19$$

The expected returns are same for companies A and B but the variations in expected returns are different. Company A's expected return is stable compared to company B's expected return. The standard deviation helps to measure the variability of return. The variability in return includes both systematic and unsystematic risks.

Characteristic regression line (CRL)

Characteristic regression line (CRL) is a simple linear regression model estimated for a particular stock against the market index return to measure risks. The model is



$$R_i = R_f + \beta_i R_m + e_i$$

R_i = Return of the i[th] stock

R_f = Risk free rate of return

β_i = Slope of the i[th] stock

R_m = Return of the market index

e_i = The error term

The security return is

$$\text{Today's security return} = \frac{\text{Today's price} - \text{Yesterday's price}}{\text{Yesterday's price}} \times 100$$

$$\text{Today's market return} = \frac{\text{Today's index} - \text{Yesterday's index}}{\text{Yesterday's index}} \times 100$$

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Like daily returns, weekly returns can be calculated by using this week's and last week's prices instead of today's and yesterday's prices in the above mentioned formula. Monthly returns also can be calculated.

Let us consider the daily prices of the Bajaj Auto stock and the NSE index for the period 5th Oct 2008 to 16th Oct 2008. The objective of this example is only to illustrate the computation of beta. Usually beta values have to be calculated from data of a fairly long period to minimize the sampling error.

Date	Bajaj Auto (Y)
October 5	597.80
October 6	570.80
October 7	582.95
October 8	559.85
October 9	554.60
October 12	545.10
October 13	519.15
October 14	560.70
October 15	560.95
October 16	597.40

To calculate the beta value, the returns have to be calculated. Then using the formula, the beta and alpha coefficient can be calculated.

$$\beta = \frac{n\sum XY - (\sum x)\sum y)}{n\sum X^2 - (\sum X)^2}$$

$$\alpha = \overline{Y} - \beta\ \overline{X}$$

The calculations are given below.

Index Return X	X^2	Bajaj Auto stock return Y	$(Y)^2$	(XY)
–6.54	42.77	–4.52	20.43	29.56
3.37	11.36	2.13	4.54	7.18
–3.01	9.06	–3.96	15.68	11.92
0.14	0.02	–0.94	00.88	–.13
–1.57	2.46	–1.71	2.92	2.68
–2.28	5.20	–4.76	22.66	10.85
3.28	10.76	8.00	64.00	26.24
–0.95	0.90	.04	.00	–00.04
0.47	0.22	6.50	42.25	3.06
–7.09	82.75	0.78	173.36	91.32

NOTES

$$\beta = \frac{n\sum XY - (\sum x)\sum y)}{n\sum x^2 - (\sum x)^2}$$

$$= \frac{9 \times 91.32 - (-7.09)\ (.78)}{9 \times 82.75 - (-7.09)^2}$$

$$\beta = 1.19$$

$$\alpha = \overline{Y} - \beta\ \overline{X}$$

$$\overline{Y} = \frac{.78}{9} = .086$$

$$\overline{X} = -\frac{7.09}{9} = -.79$$

$$= 0.086 - (1.19 \times -0.79)$$

$$\alpha = 1.02$$

$\alpha = R_f$ = risk free return in the market (Normally, it is the interest rate on the T-bills as they are considered the safest instruments).

The manual calculation seems to be laborious. At present beta can be calculated with the help of hand calculators and computers very easily. When an investor has to calculate for a long period computer would be of great use. Along with beta, other information also can be got. Given below is the computer spread sheet for the previous example. i.e. for Bajaj Auto stock return on NSE index return.

$$R_i = \alpha_1 + \beta_i R_m + e_i$$

α_1 = 1.02, b_1 = 1.19 standard error is 0.0266

Standard deviation of stock return	: 4.39
Variance of stock return	: 19.27
Standard deviation of Index return	: 3
Variance of the Index return	: 9
Correlation coefficient	: 0.795

Beta

Beta is the slope of the characteristic regression line. Beta describes the relationship between the stock's return and the index returns. In the above example, beta indicates that one per cent change in NSE index return would cause 1.19 per cent change in the Bajaj Auto stock return.

1. Beta = + 1.0
   One per cent change in market index return causes exactly one per cent change in the stock return. It indicates that the stock moves in tandem with the market.
2. Beta = + 0.5
   One per cent change in market index return causes 0.5 per cent change in the stock return. The stock is less volatile compared to the market.
3. Beta = + 2.0
   One per cent change in market index return causes 2 per cent change in the stock return. The stock return is more volatile. When there is a decline of 10 per cent in the market return, the stock with a beta of 2 would give a negative return of 20 per cent. The stocks with more than 1 beta value is considered to be risky.

4. Negative beta value indicates that the stock return moves in the opposite direction to the market return. A stock with a negative beta of –1 would provide a return of 10 per cent, if the market return declines by 10 per cent and vice versa.

Stocks with negative beta resist the decline in the market return, but stocks with negative returns are very rare.

Figure 2.3 (a, b, c) shows β= 1, β > 1 and β < 1 and the α.

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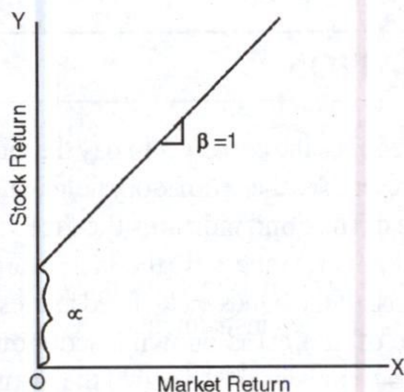


Fig. 2.3 (a) Systematic Market Risk

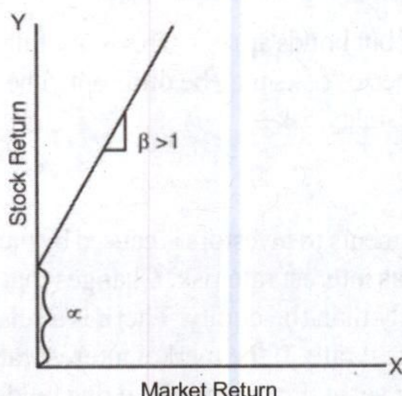


Fig. 2.3 (b) High Systematic Risk

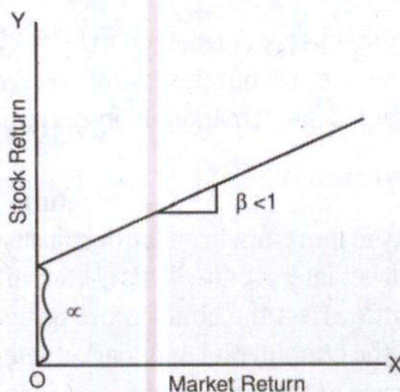


Fig. 2.3 (c) Low Systematic Risk

Alpha

The intercept of the characteristic regression line is alpha i.e. the distance between the intersection and the horizontal axis. It indicates that the stock return is independent of the market return. A positive value of alpha is a healthy sign. Positive alpha values would yield profitable return.



Alpha: The intercept of the characteristic regression line is alpha i.e. the distance between the intersection and the horizontal axis

Correlation

The correlation coefficient measures the nature and the extent of relationship between the stock market index return and the stock return in a particular period.

$$r = \frac{n\sum XY \; - \; (\sum X)\;(\sum Y)}{\sqrt{n\sum X^2 - (\sum X)^2}\;\sqrt{n\sum Y^2 - (\sum Y)^2}}$$

$$\frac{9 \times 91.32 \; - \; (-7.09\;\;(.78)}{\sqrt{9 \times 82.75 - (7.09)^2}\;\;\sqrt{9 \times 173.36 - (.78)^2}}$$

$$= \frac{827.41}{1040.73} = 0.79$$

NOTES



Bond Valuation: A bond is a contract that requires the borrower to pay the interest income to the lender at the time of maturity

The square of the correlation coefficient is the coefficient of determination. It gives the percentage of variation in the stock's return explained by the variation in the market's return. In our example,

$r^2 = (0.79)^2 = 0.62$

The interpretation is that 62 percent of variations in stock's return is explained by the variations in the NSE index return.

2.5 BOND VALUATION

A bond is a contract that requires the borrower to pay the interest income to the lender at the time of maturity. It resembles the promissory note issued by the government and corporate. The par value of the bond indicates the face value of the bond, i.e., the value stated on the bond paper. Generally, the face values of bonds are ₹ 1,000, 2,000, 5,000 and alike. Most of the bonds make fixed interest payment till the maturity period. This specific rate of interest is known as coupon rate. Coupons are paid quarterly, semi-annually and annually. At the end of the maturity period, the face value is repaid.

2.5.1 Bond Risk

Generally stocks are considered to be risky but bonds are not. This is not fully correct. Bonds do have risk but the nature and types of risks may be different. The risks are interest rate, default, marketability and callability risks.

Interest rate risk

Variability in the return from the debt instruments to investors is caused by the changes in the market interest rate. This is known as interest rate risk. Changes that occur in interest rate affect the bonds more directly than the equity. There is a relationship between the coupon rate and market interest rate. If the market interest rate moves up, the price of the bond declines and vice versa. For **example**, if one holds a 14.50 per cent bond and the market interest rate falls, from 14 per cent to 13 per cent, the bond value would be higher. In contrast, if the market interest rate goes up to 15 per cent, the price would decline to offer the buyer a yield that is proximate to the market interest rate.

Default risk

The failure to pay the agreed value of the debt instrument by the issuer in full, on time or both is the default risk. Treasury bills and bonds issued by the Central Government are devoid of this risk. The same cannot be assured of bonds/debentures issued by any other corporate bodies. The default risk occurs because of macroeconomic factors or firm-specific factors. The macroeconomic factors affect the overall system. A number of small firms found the going difficult in 1995-96 because of high interest rates in 1994 and 1995. In the case of CRB Capital Market, the bankruptcy had more to do with the firm specific factors – inefficient management rather than macroeconomic factors.

Check Your Progress

6. What are the different types of systematic risks?
7. Identify the causes for fluctuations in the interest rates.
8. What do you understand by an internal business risk?
9. What is Beta?

In order to avoid the default risk, the capacity to serve the debt by the company is rated by rating agencies. Regulators like the Reserve Bank of India and the Securities and Exchange Board of India often use credit rating to determine the eligibility of the fixed income instruments. The Credit Rating Information Services of India Limited (CRISIL), the Investment Information and Credit Rating Agency of India Limited (ICRA) and the Credit Analysis and Research Limited (CARE) are rating the bonds and other fixed income securities. In the international bond market, Moody's Investor Service and Standard and Poor's ratings are famous.

Marketability risk

Variation in return caused by the difficulty in selling the bonds quickly without having to make a substantial price concession is known as marketability risk. This risk is different from the market risk that affects all securities in the market but, marketability risk is a specific risk. The marketability or liquidity of the particular bond depends on the corporate who issues the bond. There is a possibility of a particular company's bond becoming illiquid due to the downgrading of bond's rating by the rating agencies. Managerial inefficiencies and fall in the profits may create a fear in the minds of the investors and they may not be willing to buy such bonds in the secondary market. Sometimes, a particular instrument of a company whose other instruments enjoy good liquidity may be illiquid. If an investor has to sell such illiquid investments, he may be forced to sell it at a high discount. For **example**, bonds/debentures issued by Reliance Industries enjoy high liquidity, but the same may not be true of the debentures issued by smaller companies. Thus liquidity of the particular bond or debenture depends on the image of the company.

Callability risk

The uncertainty created in the investor's return by the issuer's ability to call the bond at any time is known as callability risk. Debt instruments used to carry call option. The call option provides the issuer the right to call back the instruments by redeeming them. This facility provides a way out for the issuer if the interest rate declines. The issuer can call the bond with high interest rate and again raise funds at a lower interest rate. Since, the bond or debenture can be called at any time there is an uncertainty regarding the maturity period. This feature of the bond may depress the price level of the bond and the uncertainty element attached with the callable bonds make the investors to ask for higher yields.

2.5.2 Time Value Concept of Money

The time value concept of money is that the rupee received today is more valuable than a rupee received tomorrow. The investor will postpone current consumption only if he could earn more future consumption opportunities through investment. Individuals generally prefer current consumption to future consumption. If there is inflation in the economy, a rupee today will represent more purchasing power than a rupee at a future date.

Interest is the rent paid to owners to part with their money. The interest that the borrower pays to the lender causes the money to have a future value different from its present value. The time value of money makes the rupee invested today grow more than a rupee in the future. To quantify this concept mathematically, compounding and

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discounting principles are used. The one-period future time value of money is given by the following equation:

$$\text{Future Value} = \text{Present value } (1 + \text{interest rate})$$

If hundred rupees are put in a savings bank account in a bank for one year, the future value of money will be:

$$\text{Future Value} = ₹\ 100\ (1.0+6\%)$$
$$= 100 \times 1.06 = ₹\ 106.$$

If the deposited money is allowed to cumulate for more than one time, the period exponent is added to the previous equation.

$$\text{Future value} = (\text{Present Value})\ (1+ \text{interest rate})^t$$

t – is the number time period for which interest is accumulated on the deposited money. Suppose ₹ 100 is put for two years at 6% rate of interest, money will grow to be ₹ 112.36.

$$\text{Future Value} = \text{Present Value } (1 + \text{interest rate})^2$$
$$= 100\ (1+.06)^2$$
$$= 100\ (1.1236)$$
$$= 112.36.$$

To find out the values in a simple manner, the compound sum of ₹ 1 at the end of a period FVIF1,/K,n and compound sum of an annuity of ₹ 1 per period FVIFA tables are given in the Appendix.

Present value

The present value of money can be found by deriving the equation from the one used earlier to find the future value.

$$\text{Present value} \times (1 + \text{interest rate}) = \text{Future value.}$$

$$\text{Present value} = \frac{\text{Future value}}{1 + \text{interest rate}}$$

Here, the discounting principle is used. Today's worth of ₹ 100 to be received after a year at 10 per cent interest would be:

$$\text{Present Value} = \frac{\text{Future value}}{1 + \text{interest rate}}$$

$$= ₹\ \frac{100}{1+.10} = \frac{100}{1.1} = ₹90.90$$

If we have to find present value from different time periods, the equation can take into account the different time periods.

$$\text{Present Value} = \frac{\text{Future value}}{(1 + \text{interest rate})^t}$$

To make the calculation easier, the present value of ₹ 1:PVIF = $1/(1+K)^1$ and present value of annuity of ₹ 1 per period: $\text{PVIFA} = \left[\sum_{i=1}^{n} \frac{1}{\{1+K\}^t}\right]$ are given at the back in the Appendix.

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Bond return

Holding period return: An investor buys a bond and sells it after holding for a period. The rate of return in that holding period is:

$$\text{Holding period return} = \frac{\text{Price gain or loss during the holding period + Coupon interest rate, if any}}{\text{Price at the beginning of the holding period}}$$

The holding period rate of return is also called the one period rate of return. This holding period return can be calculated daily or monthly or annually. If the fall in the bond price is greater than the coupon payment, the holding period return will turn to be negative.

Example 2.9

(a) An investor 'A' purchased a bond at a price of ₹ 900 with ₹ 100 as coupon payment and sold it at ₹ 1000. What is his holding period return?

(b) If the bond is sold for ₹ 750 after receiving ₹ 100 as coupon payment, then what is the holding period return?

Solution:

(a) $$\text{Holding period return} = \frac{\text{Price gain + Coupon payment}}{\text{Purchase price}}$$

$$= \frac{100+100}{900} = \frac{200}{900} = .2222$$

Holding period return $= 22.22\%$

(b) $$\text{Holding period return} = \frac{\text{gain or loss+ Coupon payment}}{\text{Purchase price}}$$

$$= \frac{-150+100}{900} = \frac{-50}{900} = -.0555$$

Holding period return $= -5.5\%$.

Current yield

The current yield is the coupon payment as a percentage of current market price.

$$\text{Current yield} = \frac{\text{Annual coupon payment}}{\text{Current market price}}$$

With this measure, the investors can find out the rate of cash flow from their investments every year. The current yield differs from the coupon rate, since the market price differs from the face value of the bond. When the bond's face value and market price are same, the coupon rate and the current yield would be the same. For **example**, when the coupon payment is 8% for ₹ 100 bond with the same market price, the current yield is 8%. If the current market price is ₹ 80 then the current yield would be 10%.

2.5.3 Yield to Maturity

The concept of yield to maturity (YTM) is one of the widely used tools in bond valuation management. Arithmetically, YTM is the single discount factor that makes the present

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value of future cash flows from a bond equal to the current price of the bond. Intuitively, YTM is the rate of return, which an investor can expect to earn if the bond is held till maturity.

Yield to maturity is calculated based on the following assumptions.

1. There should not be any default. Coupon and principal amount should be paid as per schedule.
2. The investor has to hold the bond till maturity.
3. All coupons are reinvested at the YTM.

Understanding this is crucial for better investment decisions. For **example**, if an 11 per cent coupon paying bond with four years to mature has a YTM of say 13 per cent, it would be realized only if two conditions are met: One, if the bond is held till maturity (for four years), and two, if the interest received from the bond is re-invested for the rest of the period at 13 per cent. Otherwise actual or realized rate of return of the investor will be different from the expected return.

If coupon receipts are re-invested at say 10 per cent for the rest of the period, then the realized rate of return will be less than the YTM. Conversely, if the coupon receipts are reinvested at 14 per cent, the realized rate of return will be higher than the YTM.

Any difference in the re-investment rate will cause a difference between the actual return and the YTM. In this sense, the YTM is only a measure of yield. It cannot be regarded as a measure of return from a coupon-paying bond.

The YTM concept has a slightly different meaning for zero coupon bonds (ZCB), popularly known as deep discount bonds (DDB). ZCBs do not carry any coupon but are issued at a price discounted to the face value. On maturity, these bonds are redeemed at face value. Since these bonds do not have any coupon payments during the life of the bond, the question of re-investment of coupon payments does not arise at all. There is no re-investment risk for ZCBs. DDB will have a market price of 20% or more below its face value. These bonds are perceived to be riskier then similar bonds and are thus priced accordingly.

To find out the yield to maturity the present value technique is adopted. The formula is,

$$\text{Present value} = \frac{\text{Coupon}_1}{(1+y)^1} + \frac{\text{Coupon}_2}{(1+y)^2} + ... + \frac{(\text{Coupon}_n + \text{face value})}{(1+y)^n}$$

Y = The yield to maturity.

Example 2.10: A four-year bond with the 7% coupon rate and maturity value of ₹ 1000 is currently selling at ₹ 905. What is its yield to maturity?

Solution:

Since all the three values are known out of the four values, it can be found out by using trial and error procedure. Let us try ten per cent.

Cash Flow	PV for 10%	PV of CF
70	0.9091	63.64
70	0.8264	57.85
70	0.7513	52.59
1070	0.6830	730.82
		₹ 904.90

NOTES

The approximate yield to maturity can be found out by using the following formula too.

$$Y = \frac{C + (P \text{ or } D / \text{years to maturity})}{(P_o + F)/2}$$

Y = Yield to maturity

C = Coupon interest

P or D = Premium or discount

P_o = Present Value

F = Face value

In the case of previous sum

$$= \frac{70 + (95/4)}{(905 + 1000)/2} = \frac{93.75}{952.5} = 0.098$$

Y = 9.8%

Yield to maturity is 9.8%

Using the formula, the value of the bond can be assessed and buying decisions can be made. By having the expected yield to maturity, the present price of the bond can be found. The difference between the actual price and calculated price indicates whether the bond is underpriced or overpriced. When the bond's prevailing price is lower than the calculated price, it is known as underpriced. Taking the previous example, the expected yield to maturity is 10 per cent at the price ₹ 905. If the market price is ₹ 850, it is underpriced. The simple way to calculate is

$$NPV = \frac{\text{Coupon}}{(1+y)^t} = \frac{P_m}{(1+y)^t}$$

NPV = Net Present Value

P_m = the market price.

Example 2.11: A ₹ 100 par value bond bearing a coupon rate of 11% matures after 5 years. The expected yield to maturity is 15%. The present market price is ₹ 82. Can the investor buy it?

Solution:

$$\Sigma NPV = \frac{\text{Coupon}}{(1+y)^n} = \frac{P_m}{(1+y)^n}$$

$$= 11 \times 3.3522 + 100 \times 0.4972.$$

$$= 36.87 + 49.72 = 86.59$$

$$= 86.59 - 82 = 4.59$$

The net present value is higher, that is, the market value is lower than the calculated value. Hence, the bond is underpriced and the investor can buy the bond.

2.5.4 Bond Valuation Theorems

The value of the bonds depends upon three factors namely, the coupon rate, years to mature and the expected yield to maturity or the required rate of return. On the basis of this, bond value theorems have been evolved.

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Theorem 1

If the market price of the bond increases, the yield would decline and vice versa.

Example	Bond A	Bond B
Par value	₹ 1000	₹ 1000
Coupon rate	10%	10%
Maturity period	2 years	2 years
Market price	₹ 874.75	₹ 1035.66
Yield	18%	8%

Even though the bonds are of same maturity and coupon rate, the difference in the market price leads to difference in the yield. The bond with low price has high yield because with lesser amount of money more return is earned.

Theorem 2

If the bond's yield remains the same over its life, the discount or premium depends on the maturity period.

Example	Bond A	Bond B
Par value	₹1000	₹1000
Coupon rate	10%	10%
Yield	15%	15%
Maturity Period	2	3
Market Price	918.71	885.86
Discount	₹ 81.29	₹ 114.14

This means, the bond with a short term to maturity sells at a lower discount than the bond with a long term to maturity.

Theorem 3

If a bond's yield remains constant over its life, the discount or premium amount will decrease at an increasing rate as its life gets shorter. Consider a bond with the face value of ₹ 1000, and maturity period of 5 years with 10% yield to maturity. The calculated values are given as follows:

Years to Maturity	The Present of Value
5	620.9
4	683.0
3	751.3
2	826.4
1	909.1

This example shows that the discount rate declines at a lower when the bond approaches to maturity. The same point is given in Figure 2.4.

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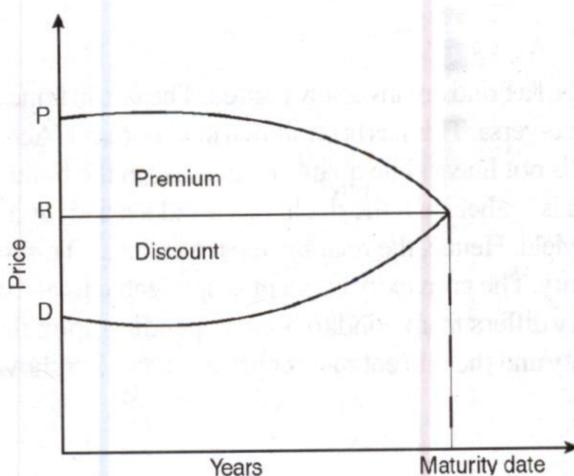


Fig. 2.4 Bond's Price Changes during its Life

where

P = Premium

R = Redemption price

D = Discount.

Theorem 4

An increase in the bond's price for a decline in the bond's yield is greater than the fall in the bond's price for a raise in the yield. Take a bond of 10% coupon rate, maturity period of five years with the face value of ₹ 1000. If the yield declines by 2%, that is to 8% then the bond price will be ₹ 1079. 87

= ₹ 100(PVIFA 8%, 5 yrs) +1000(PVIF 8%, 5 yrs)

= ₹ 100 x 3.9927+₹ 1000 x 0.6806

= ₹ 1079.87.

If the yield increases by 2%, then the bond price will be ₹ 927.88.

= ₹ 100(PVIFA 12%, 5 yrs) + 1000(PVIF 12%, 5 yrs)

= ₹ 100 × 3.6048 + ₹ 1000 × .0.5674

= ₹ 927.88

Now the fall in yield has resulted in a raise of ₹ 79.86 but the raise in the yield caused a variation of ₹ 72.22 in the price.

Theorem 5

The change in the price will be lesser for a percentage change in bond's yield if its coupon rate in higher. It is explained by the following example:

Example	Bond A	Bond B
Coupon rate	10%	8%
Yield	8%	8%
Maturity Period	3	3
Price	₹ 105.15	₹ 100
Face Value	₹ 100.00	₹ 100.00
Yield Raise	1%	1%
Price after yield raises	₹ 102.53	₹ 97.47
Percentage Change in price	2.4%	2.53%

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2.5.5 Convexity

The price and yield of a bond are inversely related. The rise in bond price would cause a fall in yield and vice-versa. This has been shown in Theorem 1. According to Theorem 4, the relationship is not linear. The quantum increase in the bond's price for a given decline in the yield is higher than the decline in bond's price for a similar amount of increase in bond's yield. Hence, the relationship is not linear. This relationship is often referred to convexity. The convexity concept is applicable to all types of bonds. The degree of convexity differs from bond to bond depending upon the size of the bond, the years to maturity and the current market price. Figure 2.5 shows the convexity in yield.

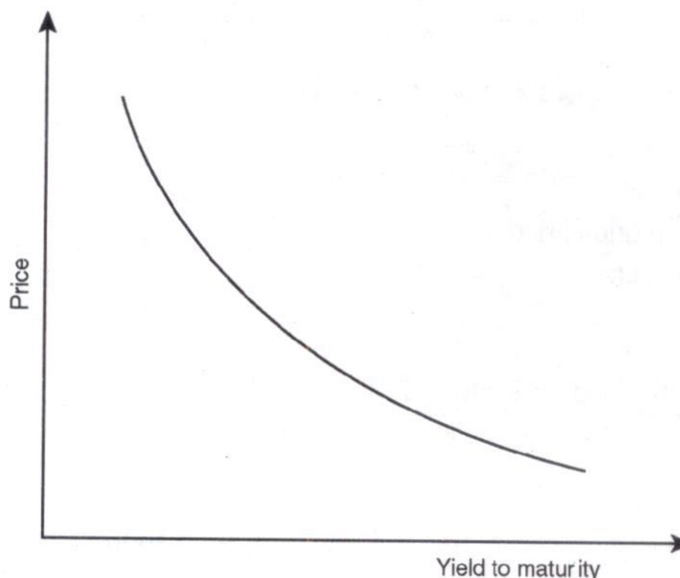


Fig. 2.5 Bond Convexity

Term structure of interest rate (yield curve)

The bond portfolio manager is often concerned with two aspects of interest rates; the level of interest rate and the term structure of interest rate. The relationship between the yield and time or years to maturity is called term structure. The term structure is also known as yield curve.

In analysing the effect of maturity on yield all other influences are held constant. Usually pure discount instruments are selected to eliminate the effect of coupon payments. The bonds chosen do not have early redemption features. The maturity dates are different but the risks, tax liabilities and redemption possibilities are similar.

The general perception is that the curve will be upward moving up to a point then it becomes flat. This is indicated in the following Figure 2.6.

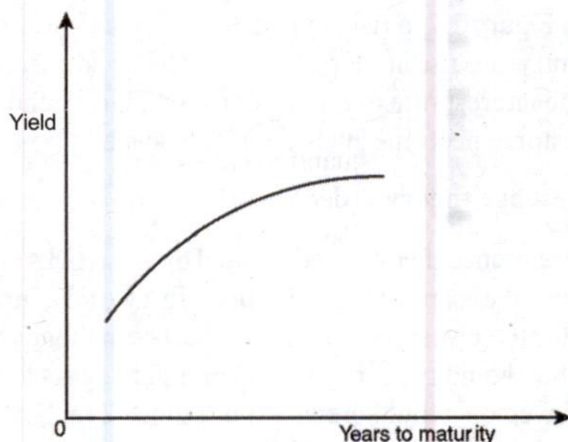


Fig. 2.6 Rising Yield Curve

There are at least three competing theories that attempt to explain the term structure of the interest rates viz., the expectation theory, liquidity preference theory and preferred habitat or segment theory.

1. Expectation theory

The theory was developed by J.R. Hicks (1939), F. Lutz (1940) and B. Malkiel (1966). According to the expectation theory, the shape of the curve can be explained by the expectations of the investors about the future interest rates. If the short term rates are expected to be relatively low in the future, then the long term rate will be below the short-term rate. There are three reasons for the investors to anticipate the fall in the interest rate

1. Anticipation of the fall in the inflation rate and reduction in the inflation premium.
2. Anticipation of balanced budget or cut in the fiscal deficit.
3. Anticipation of recession in the economy, and a fall in the demand for funds by the private corporate.

The long-term rates will exceed the current short-term rates if there is an expectation that the market rates would be higher in the future. Thus the yield curve depends upon the expectations of the investors.

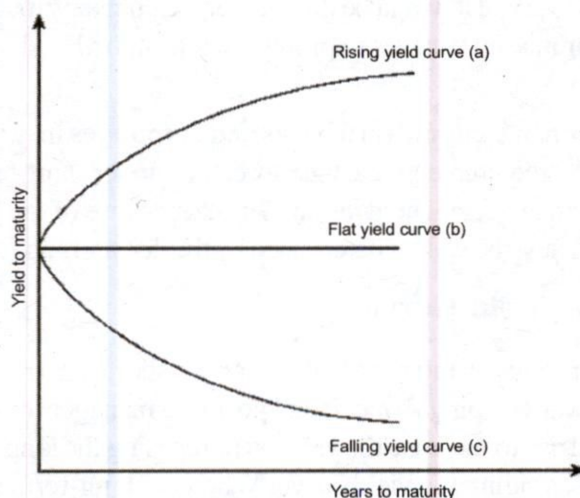


Fig. 2.7 Various Yield Curves

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As shown in Figure 2.7, a rising yield curve (a) indicates that the investors' expectation of a continuous rise in interest rate. The flat yield curve (b) means that the investors expect the interest rate to remain constant. The declining yield curve (c) shows that the investor expects the interest rate to decline.

2. Liquidity preference theory

Keynes' liquidity preference theory as advocated by J.R. Hicks (1939) accepts that expectations influence the shape of the yield curve. In a world of uncertainty, it would be more desirable for the investors to invest in short-term bonds than on long-term bonds because of their liquidity property. If no premium exists for holding the long-term instruments, investors would prefer to hold short-term bonds to minimize the possible variation in the nominal value of their portfolio.

The exponents of the liquidity preference theory believe that the investors prefer short term rather than long term. Hence they must be motivated to buy the long-term bonds or lengthen the investment horizon. The bond issuing corporate or contributor pay premium to motivate the investors to buy. This liquidity premium theory indicates that in years time the forward rates are actually higher than the projected interest rate.

3. Segmentation theory

Critics of the expectation theory, such as, J. Culbertson (1957) and F.V.Modigliani and R. Sutch (1966) pointed out that the liquidity preferences cannot be the main consideration for all classes of investors. In their view insurance companies, pension funds and even retired persons prefer the long-term rather than short-term securities to avoid the possible fluctuations in the interest rate. This can be explained in detail.

Life insurance companies offer insurance policies that do not require any payment for a long time. For **example**, an insurance policy issued to a 25-year old individual may involve another 20 or more years before the company has to make a payment. Premium payments are fixed by the expected future rate of interest. If the insurance company invests the funds in a long-term bond, the interest the bond would earn is certain and if the earned interest rate is higher than the promised interest rate, the company stands to gain and its risk is also reduced. If it invests in one year bonds, the risk of re-investment is there and if there is a fall in the market interest rate, the insurance company stands to lose and it would be difficult for the company to meet its obligation. This leads the insurance companies to prefer the long-term bonds rather than short-term bonds.

On the other hand, commercial banks and corporates may prefer liquidity to meet their short term requirements and therefore, they prefer short-term issues. Supply and demand for fund are segmented in sub markets because of the preferred habitats of the individuals. Thus, the yield is determined by the demand and supply of the funds.

2.5.6 Riding the Yield Curve

When the long-term coupon rates are higher than the short-term rates, the yield curve would have an upward sloping shape. Bond portfolio manager tries to exploit this to his advantage and tries to increase the yield by purchasing the long-term bonds. This strategy is known as riding the yield curve. When the long-term bond approaches

maturity, the interest rate may get closer to the short term bond but, there would be capital gain. The bond portfolio manager may maintain the long-term bond to utilize the capital gains as the bond moves to maturity date and "rides down the yield curve" to the lower interest rate, which will be appropriate when it becomes shorter term bond. Riding the yield curve would be successful only if the market interest rate does not rise. Sometimes the market interest rate may increase or short term end of the yield curve may slope upwards causing capital losses to the bond portfolio manager. To manage the situation efficiently, the bond portfolio manager should be continuously watchful about the shape of the yield curve and the shifts that occur in the market interest rates.

2.5.7 Duration

Duration measures the time structure of a bond and the bond's interest rate risk. The time structure of investment in bonds is expressed in two ways. The common way to state is how many years he has to wait until the bond matures and the principal money is paid back. This is known as asset time to maturity or its years to maturity. The other way is to measure the average time until all interest coupons and the principal is recovered. This is called Macaulay's duration. Duration is defined as the weighted average of time periods to maturity, weights being present values of the cash flow in each time period. The formula for duration is,

$$D = \frac{\frac{C_1}{(1+r)}}{P_o} + \frac{\frac{C_2}{(1+r)^2}}{P_o}2 + ... + \frac{\frac{C_t}{(1+r)^t}}{P_o} \times T$$

This can be summarized as

$$D = \sum_{t=1}^{T} \frac{P_v(C_t)}{P_o} \times t$$

D = Duration

C = Cash flow

r = Current yield to maturity

T = Number of Years

$PV(C_t)$ = Present value of the Cash flow

P_0 = Sum of the present values of cash flow

Example 2.12: Calculate the duration for bond A and Bond B with 7 per cent and 8 per cent coupons having maturity period of 4 years. The face value is ₹ 1000. Both the bonds are currently yielding 6 per cent.

Solution:

$$D = \frac{\frac{C_1}{(1+r)}}{P_o}1 + \frac{\frac{C_2}{(1+r)^2}}{P_o}2 + \frac{\frac{C_3}{(1+r)^3}}{P_o}3 + \frac{\frac{C_4}{(1+r)^4}}{P_o}4$$

C_4 includes principal repayment

Bond 'A' with 7% Coupon rate.

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Year	Cash Flow C_t	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_t}{(1+r)^t}}{P_o}$	$\frac{\frac{C}{(1+r)^t}}{P_o} \times t$
1	70	0.943	66.01	0.0638	0.0638
2	70	0.890	62.30	0.0602	0.1204
3	70	0.8396	58.77	0.0568	0.1704
4	1070	0.7921	847.55	0.8191	3.2764
			P_o= ₹ 1034.63		D=3.6310

Bond 'B' with 8% Coupon Rate

Year	Cash Flow C_t	$\frac{1}{(1+r)^t}$	PV x CT	$\frac{\frac{C_t}{(1+r)^t}}{P_o}$	$\frac{\frac{C_t}{(1+r)^t}}{P_o.} \times t$
1	80	0.943	75.44	0.0706	0.0706
2	80	0.890	71.200	0.0666	0.1332
3	80	0.8396	67.168	0.0628	0.1884
4	1080	0.7921	855.468	0.8000	3.2000
			P_O= ₹ 1069.276		D=3.5922

Example	'A' Bond	'B' Bond
Face Value	₹ 1000.00	₹ 1000.00
Coupon Rate	7%	8%
Years to Maturity	4.0	4.0
Macaulay's Duration	3.631 Years	3.592 Years

From Example 2.12, it is clear that the bond with larger coupon payments has a shorter duration compared to the bond with low coupon rate.

General rule:

1. Larger the coupon rate, lower the duration and less volatile the bond price.
2. Longer the term to maturity, the longer the duration and more volatile the bond.
3. Higher the yield to maturity, lower the bond duration and bond volatility, and vice versa.
4. In a zero coupon bond, the bond's term to maturity and duration are the same. The zero coupon bond makes only one balloon payment to repay the principal and interest on the maturity date.

Importance of duration

The concept of duration is important because it provides more meaningful measure of the length of a bond, helpful in evolving various strategies for portfolio management and measures the sensitivity of the bond price to changes in the interest rate.

Duration and price changes

The price of the bond changes according to the interest rate. Bond's price changes are commonly called bond volatility. Duration analysis helps to find out the bond price changes as the yield to maturity changes. The relationship between the duration of a bond and its price volatility for a change in the market interest rate is given by the following formula :

$$\text{Percentage Change in Price} = \frac{-MD\ [BP]}{100}$$

MD = Modified duration

BP = Basis point is .01 of 1% (1%=100).

$$\text{Modified duration MD} = \frac{D}{1+\frac{R}{P}}$$

where

D = Duration

R = Market Yield

P = Interest payment per year (usually two)

NOTES

2.5.8 Immunization

Immunization is a technique that makes the bond portfolio holder relatively certain about the promised stream of cash flows. The bond interest rate risk arises from the changes in the market interest rate. The market rate affects the coupon rate and the price of the bond. In the immunization process, the coupon rate risk and the price risk can be made to offset each other. Whenever there is an increase in the market interest rate, the prices of the bonds fall. At the same time, the newly issued bonds offer higher interest rate. The coupon can be reinvested in the bonds offering higher interest rate and losses that occur due to the fall in the price of bond can be offset and the portfolio is said to be immunized.



Immunization: Immunization is a technique that makes the bond portfolio holder relatively certain about the promised stream of cash flows

Process

The bond portfolio manager or investor has to calculate the duration of the promised outflow of the funds and invest in a portfolio of bonds which has an identical duration. The bond portfolio duration is the weighted average of the durations of the individual bonds in the portfolio. For **example** if an investor has invested equal amount of money in three bonds namely A, B and C with a duration of 2, 3 and 4 years respectively, then the bond portfolio duration is

$D = 1/3 \times 2 + 1/3 \times 3 + 4 \times 1/3$

$= 0.66 + 1 + 1.33.$

$D = 2.99$ (or) 3 years.

By matching the outflow duration with cash inflow duration from bond investment the bond manager can offset the interest rate risk and price risk. The portfolio of money to be invested between the different types of bonds also can be found. The equation is

Investment outflow = (X_1, ×) Duration of bond 1) + (X_2, ×) Duration of bonds2)

X_1, X_2 proportion of investment on bond 1 and 2.

NOTES

Example 2.13

Abisekh has ₹ 50,000 to make a one-time investment. His son has entered higher secondary school and he needs his money back after two years for his son's educational expenses. As Abisekh's outflow is a one-time outflow and the duration is two years, he has a choice of two types of bonds.

1. Bond 'A' has a coupon rate of 7 per cent and maturity period of four years with a current yield of 10 per cent. Current price is ₹ 904.90.
2. Bond 'B' has the coupon rate of 6 per cent, a maturity period of one year and a current yield of 10 per cent. The current price is ₹ 963.64.

Risk

The two bonds pose two types of risk to him. He can invest all his money in bond 'B' with the aim of reinvesting the proceeds from the maturing bonds into another issue of one-year period. If the interest rate declines in the market during the next year, he has to reinvest his money in low yielding bonds and may incur a loss. Now, he has to face the reinvestment risk.

On the other hand, if he invests his money in 'A' bond, that also involves certain amount of risk. He cannot hold it till it matures, because he needs the money after two years and has to sell it in the middle. If there is a rise in the market interest rate then the price of the bond will fall down and vice versa. If a rise in interest rate is assumed, the investor has to incur loss.

Solution:

Abisekh can solve the problem by investing part of the money in one year bonds and a part in four year bonds. But, he should know how much to be invested in each of these bonds. This can be got by solving the following equation.

$$(X_1 \times D_1) + (X_2 \times D_2) = 2$$

That is X_1 = the proportion of investment in bond 'A'

X_2 = the proportion of investment in bond 'B'

D_1 = Duration of bond 'A'

D_2 = Duration of bond 'B'

The duration of the one-year bond is only one year because it makes one time payment.

Duration of bond 2,

$$D = \left[\sum_{t=1}^{T} \frac{P_v(C_t)}{P_o} \times t\right]$$

Year	Cashflow C_t	Present Value factor 10%	$P_v(C_t)$	$\frac{P_v(C_t)}{P_o}$	$\frac{P_v(C_t)}{P_o} \times t$
1	70	.9091	63.64	0.0703	0.0703
2	70	.8264	57.85	0.0639	0.1278
3	70	.7513	52.59	0.0581	0.1743
4	1070	.6830	730.81	0.8076	3.2305
			P_0 = 904.89		D=3.6029

Applying the formula

$$(X \times 1) + (X_2 \times 3.6030) = 2$$

X_1 can be written as $(1 - X_2)$ Then

$$[(1 - X_2)1] + [X_2 . 3.603] = 2$$
$$1 - X_2 + 3.6030\ X_2 = 2$$
$$X_2 = 0.3842$$
$$X_1 = 0.6158.$$

Abisekh should put 61.58% of his investible funds in one year bond and 38.42 per cent in the four year bond.

For investing in both the bonds he needs ₹ 41322.31 = ₹ 50,000% $(1.10)^2$] to have fully immunized bond portfolio. The money to be invested is,

One year bond = ₹ 41322.31 × X_1 = ₹ 41322.31 × 0.6158
= ₹ 25446.28

Four year bond = 41322.31 × 0.3842 = 15876.03.

From here we can find out how many bonds he can buy,

One year bond price ₹ 963.64

$$= ₹\ \frac{25446.28}{963.64} = 26.4$$

Approximately 26 bonds,

Four year bond price = 904.89.

$$= ₹\ \frac{15876.03}{904.89} = 17.54$$

Approximately = 18 bonds.

According to the theory, the rise in the market interest is offset by the reinvestment of matured bonds at a higher rate of interest. Theoretically, it seemed to be very simple, but in practice, it is not so simple because of the following reasons:

1. Immunization and duration are based on the assumption that the change in the interest rate would occur before payments are received from both the bonds. This may not be true always. The shift may occur after receiving the cash flow.
2. Another assumption is that the bonds have same yield. This also may not be applicable. The yield may vary according to the period of maturity.
3. It is assumed that the shift in the interest rate affects all the bonds equally. Many a time, the shift in interest rates affects different bonds differently.
4. The whole analysis is based on the belief that there will not be any call risk or default risk. But evidence has proved that bond investment is not free from call risk or default risk.

2.5.9 Portfolio Risk

Portfolio risk is the combined risk of individual investments in the portfolio. It can be calculated either as portfolio standard deviation or as portfolio beta. (Details in Unit 4).

NOTES

Check Your Progress

10. Identify the risks involved in bonds.
11. What do you understand by the time value concept of money?
12. What are the assumptions in the calculation of yield to maturity?
13. List the factors that determine the value of bonds.
14. What is Keynes' liquidity preference theory?

2.6 SUMMARY

NOTES

Some of the important concepts discussed in this unit are:

- The return from holding a stock consists of capital appreciation and dividend.
- The discounted present value of all future income from the stock decides its present value or price.
- The extension of the constant growth model is the two-stage growth model. It is assumed to have a period of extraordinary growth and a period of normal growth.
- In the three-stage growth model, three growth rates are used.
- Present price of the stock is estimated with the help of P/E ratio. Earnings, growth, risk and dividend payout ratios decide the price of the share.
- The Whitbeck Kisor model explains the relationship between earnings' growth rate, dividend payout, standard deviation in growth rate (risk) and the P/E ratio.
- Risk is measured by the variability of return. Risk has two components, systematic and unsystematic risk.
- Systematic risk affects the market as a whole. A tangible event like the Pokaran blast and an intangible event like the investor's pyschology affect the entire stock market.
- Interest rate risk is the variation in return caused by the changes in the market interest rate.
- Purchasing power risk is caused by inflation. Inflation reduces the real rate of return earned from the securities.
- Unsystematic risk is unique to a particular industry or company. This is classified into business risk and financial risk.
- Business risk is caused by the operating environment of the business. This may be caused by internal factors like fluctuations in sales or personnel management or external factors like government policies, rules and regulations.
- Financial risk emerges from the debt component of the capital structure.
- A careful analysis of the past, planning and diversification of the investment can moderate the effects of the various risk factors.
- Statistically standard deviation and beta estimation help to quantify the risk.
- Bonds are also associate have risk. Changes that occur in the market interest rate affect their value. It is known as interest rate risk. Default risk, marketability risk and callability risk are also associate with bonds.
- Yield to maturity is the single discount factor that makes the present value of future cashflows from a bond equal to current price of the bond.
- Bond value theorem states that market price affects the yield and vice versa. This leads to convexity in the yield curve.
- The relationship between the yield and time to maturity is the term structure of interest rate. The term structure of interest rate is explained by expectation theory, liquidity theory and segmentation theory.

- When the long term coupon rate is higher than the short term rate, the bond portfolio manager may switch over from short term bond to long term bond and earn capital gains. This is known as riding the yield curve.
- Duration is a measure of the average time until all interest coupons and the principal amount is recovered.
- Immunization is the technique adopted to make the cashflows from holding the bond relatively certain. On the basis of duration immunization can be done.

2.7 ANSWERS TO 'CHECK YOUR PROGRES'

1. The rate of return is called holding period return, because its calculation is independent of the passages of the time.
2. Risk is as a chance that the actual outcome from an investment will differ from the expected outcome.
3. The historical returns or expost returns are derived from the cash flow received as well as the price changes that occur during the period of holding the stock or any asset.
4. The ex-ante or future returns are calculated with the help of probability. Probability describes the likelihood of an event, i.e., the likelihood of getting a certain rate of return.
5. P/E ratio depends on the dividend payout, discount rate and return on equity. All these factors affect the price earning multiples.
6. The different types of systematic risks are market risks, interest rate risks and purchasing power risks.
7. The fluctuations in the interest rates are caused by changes in the government monetary policy and changes that occur in the interest rates of treasury bills and the government bonds.
8. Internal business risk is associated with the operational efficiency of the firm. The operational efficiency differs from company to company. The efficiency of operation is reflected on the company's achievement of its pre-set goals and the fulfillment of the promises to its investors.
9. Beta is the slope of the characteristic regression line. Beta describes the relationship between the stock's return and the index returns.
10. Risks involved in bonds are interest rate risks, default risks, marketability risks and callability risks.
11. The time value concept of money is that the rupee received today is more valuable than a rupee received tomorrow. The investor will postpone current consumption only if he could earn more future consumption opportunities through investment. Individuals generally prefer current consumption to future consumption.
12. Yield to maturity (YTM) is calculated based on the following assumptions.
    - There should not be any default. Coupon and principal amount should be paid as per schedule.

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- The investor has to hold the bond till maturity.
- All coupons are reinvested at the YTM.

13. The value of the bonds depends upon three factors namely, the coupon rate, years to mature and the expected yield to maturity or the required rate of return.
14. Keynes' liquidity preference theory accepts that expectations influence the shape of the yield curve. In a world of uncertainty, it would be more desirable for the investors to invest in short-term bonds than on long-term bonds because of their liquidity property.

2.8 QUESTIONS AND EXERCISES

Short-Answer Questions

1. How is the expected rate of return calculated with the help of probability?
2. How are multiple year holding stock prices estimated with the two-stage and three-stage growth models?
3. How are risk and uncertainty different from each other?
4. What is external business risk?
5. Explain the term 'structure of the interest rate'.
6. How would you assess the present value of a bond?
7. What is the relationship between duration and price change?

Long-Answer Questions

1. Explain with the help of an example how you would calculate the present value of a stock when the holding period is more than a year.
2. When are the price-earning (P/E) ratios used? List the advantages of the P/E ratio models over the discounting models.
3. Explain the characteristics of Whitbeck Kisor Model.
4. What is systematic risk? Explain its sub-divisions.
5. Explain political risk arising out of the change in the government policy.
6. How can an investor be protected from inflation?
7. How can risk be measured? Explain in detail.
8. Explain the various bond value theorems with examples.
9. How would you immunize the bond portfolio using the immunization technique?

UNIT 3 APPROACHES TO INVESTMENT ANALYSIS

NOTES

Structure

3.0 INTRODUCTION

In this unit, you will learn about two approaches to investment analysis, namely fundamental approach and technical approach. The intrinsic value of an equity share depends on a multitude of factors. The earnings of the company, the growth rate and the risk exposure of the company have a direct bearing on the price of the share. These factors, in turn, rely on a host of other factors like the economic environment in which they function, the industry they belong to, and finally the performance of the companies'. The fundamental school of thought appraised the intrinsic value of shares through economic analysis, industry analysis, company analysis and financial analysis.

A technical analyst mainly studies the stock price movement of the security market. If there is an 'up' trend in the price movement, the investor may purchase the scrip. With the onset of 'fall' in price, he may sell it and move from the scrip. Basically, technical analysts and fundamental analysts aim to earn a good return on investment.

3.1 UNIT OBJECTIVES

After going through this unit, you should be able to:

- Discuss economic analysis, industrial analysis and company analysis
- Assess financial statements as a good source of financial information about a company
- Summarize the concept of earnings of the company
- Explain how growth in earnings influences the value of the stock

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- Discuss technical analysis and its various aspects such as assumptions and history of technical analysis
- Summarize the information on technical tools such as Dow theory, primary and secondary trends and minor trends
- Describe the concepts of indicators, odd lot trading and moving average and chart patterns

3.2 FUNDAMENTAL ANALYSIS: CONCEPTS AND COMPONENTS

The level of economic activity has an impact on investment in many ways. If the economy grows rapidly, the industry can also be expected to show rapid growth and vice versa. When the level of economic activity is low, stock prices are low, and when the level of economic activity is high, stock prices are high reflecting the prosperous outlook for sales and profits of the firms. The analysis of macro economic environment is essential to understand the behaviour of the stock prices.

3.2.1 Economic Analysis and its Tools

The commonly analysed macro economic factors are as follows:

- **Gross domestic product (GDP):** GDP indicates the rate of growth of the economy. GDP represents the aggregate value of the goods and services produced in the economy. GDP consists of personal consumption expenditure, gross private domestic investment and government expenditure on goods and services and net export of goods and services. The estimates of GDP are available on an annual basis. The growth rate of the economy points out the prospects for the industrial sector and the return investors can expect from investment in shares. A higher growth rate is more favourable to the stock market.
- **Savings and investment:** It is obvious that growth requires investment which in turn requires a substantial amount of domestic savings. Stock market is a channel through which the savings of the investors are made available to the corporate bodies. Savings are distributed over various assets like equity shares, deposits, mutual fund units, real estate and bullion. The saving and investment patterns of the public affect the stock to a great extent.
- **Inflation:** Along with the growth of GDP, if the inflation rate also increases, then the real rate of growth would be very little. The demand in the consumer product industry is significantly affected. The industries which come under the government price control policy may lose the market; for example, Sugar industry. The government control over this industry, affects the price of the sugar and thereby the profitability of the industry itself. If there is a mild level of inflation, it is good to the stock market but high rate of inflation is harmful to the stock market.
- **Interest rates:** The interest rate affects the cost of financing to the firms. A decrease in interest rate implies lower cost of finance for firms and more profitability. More money is available at a lower interest rate for the brokers who are doing business with borrowed money. Availability of cheap fund encourages speculation and rise in the price of shares.

- **Budget:** The budget draft provides an elaborate account of the government revenues and expenditures. A deficit budget may lead to high rate of inflation and adversely affect the cost of production. Surplus budget may result in deflation. Hence, balanced budget is highly favourable to the stock market.
- **The tax structure:** Every year in March, the business community eagerly awaits the Government's announcement regarding the tax policy. Concessions and incentives given to a certain industry encourage investment in that particular industry. Tax relief is given to encourage savings. The Minimum Alternative Tax (MAT) levied by the Finance Minister in 1996 adversely affected the stock market. Ten years of tax holiday for all industries to be set up in the northeast is provided in the 1999 budget. The type of tax exemption has an impact on the profitability of the industries.
- **The balance of payment:** The balance of payment is the record of a country's money receipts from and payments abroad. The difference between receipts and payments may be surplus or deficit. Balance of payment is a measure of the strength of rupee on external account. If the deficit increases, the rupee may depreciate against other currencies, thereby, affecting the cost of imports. The industries involved in the export and import are considerably affected by the changes in foreign exchange rate. The volatility of the foreign exchange rate affects the investment of the foreign institutional investors in the Indian stock market. A favourable balance of payment renders a positive effect on the stock market.
- **Monsoon and agriculture:** Agriculture is directly and indirectly linked with the industries. For **example**, Sugar, Cotton, Textile and Food processing industries depend upon agriculture for raw material. Fertilizer and insecticide industries are supplying inputs to the agriculture. A good monsoon leads to higher demand for input and results in bumper crop. This would lead to buoyancy in the stock market. When the monsoon is bad, agricultural and hydel power production would suffer. They cast a shadow on the share market.
- **Infrastructure facilities:** Infrastructure facilities are essential for the growth of industrial and agricultural sector. A wide net work of communication system is a must for the growth of the economy. Regular supply of power without any power cut would boost the production. Banking and financial sectors also should be sound enough to provide adequate support to the industry and agriculture. Good infrastructure facilities affect the stock market favourably. In India even though infrastructure facilities have been developed, they are not adequate. The government has liberalized its policy regarding the communication, transport and power sector. For **example**, power sector has been opened up to the foreign investors with assured rates of return.
- **Demographic factors:** The demographic data provides details about the population by age, occupation, literacy and geographic location. This is needed to forecast the demand for the consumer goods. The population by age indicates the availability of able work force. The cheap labour force in India has encouraged many multinationals to start their ventures. Indian labour is cheaper compared to the Western labour force. Population, by providing labour and demand for products, affects the industry and stock market.

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The balance of payment: The balance of payment is the record of a country's money receipts from and payments abroad.

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Economic forecasting

To estimate the stock price changes, an analyst has to analyse the macro economic environment and the factors peculiar to the industry he is concerned with. The economic activities affect the corporate profits, investors, attitude and the share prices. Fall in the GDP or slackness in the economic growth may lead to fall in corporate profit and consequently the security prices. For the purpose of economic analysis, an analyst should be familiar with the forecasting techniques. He should know the advantages and disadvantages of various techniques. The common techniques used are analysis of key economic indicators, diffusion index, surveys and econometric model building. These techniques help him to decide the right time to invest and the type of security he has to purchase, i.e. stocks or bonds or some combination of stocks and bonds.

Economic indicators

The economic indicators are factors that indicate the present status, progress or slow down of the economy. They are capital investment, business profits, money supply, GNP, interest rate, unemployment rate, etc. The economic indicators are grouped into leading, coincidental and lagging indicators. The indicators are selected on the basis of the following criteria:

- Economic significance
- Statistical adequacy
- Timing
- Conformity

The leading indicators indicate what is going to happen in the economy. It helps the investor to predict the path of the economy. The popular leading indicators are the fiscal policy, monetary policy, productivity, rainfall, capital investment and the stock indices. The fiscal policy shows what the government aims at and the fiscal deficit or surplus has an effect on the economy. The tax policy of the government may act as a boost or a deterrent to the industry. The sops given to the export oriented industries may improve the exports of the economy. Likewise, the cheap money or the tight money policy adopted by the monetary authorities also indicates the future effects of the policy on the industry. The rise of BSE Sensex and NSE Nifty shows that the economy is heading for recovery.

The coincidental indicators indicate what the economy is. The coincidental indicators are gross national product, industrial production, interest rates and reserve funds. GDP is the aggregate amount of goods and services produced in the national economy. The gap between the budgeted GDP and the actual GDP attained indicates the present situation. If there is a large gap between the actual growth and potential growth, the economy is slowing down. Low corporate profits and industrial production show that the economy is hit by recession.

The changes that are occurring in the leading and coincidental indicators are reflected in the lagging indicators. Lagging indicators are identified as unemployment rate, consumer price index and flow of foreign funds. These leading, coincidental and lagging indicators provide an insight into the economy's current and future position.



Diffusion index: Diffusion index is a composite or consensus index. The diffusion index consists of leading, coincidental and lagging indicators.

Diffusion index: Diffusion index is a composite or consensus index. The diffusion index consists of leading, coincidental and lagging indicators. This type of index has been constructed by the National Bureau of Economic Research in USA. But the diffusion index is complex in nature to calculate and the irregular movements that occur in individual indicators cannot be completely eliminated.

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Econometric model building

For model building several economic variables are taken into consideration. The assumptions underlying the analysis are specified. The relationship between the independent and dependent variables is given mathematically. While using the model, the analyst has to think clearly all the inter-relationship between the variables. When these inter-relationships are specified, he can forecast not only the direction, but also the magnitude. But his prediction depends on his understanding of economic theory and the assumptions on which the model has been built.

3.2.2 Industrial Analysis and its Tools

An industry is a group of firms that have similar technological structure of production and produce similar products. For the convenience of the investors, the broad classification of the industry is given in financial dailies and magazines. Companies are distinctly classified to give a clear picture about their manufacturing process and products. A typical classification of major industries may be as given in Table 3.1 below.

Table 3.1 *Industry Groups*

S.No	*Industries*
1	Food products
2	Beverages, Tobacco and Tobacco products
3	Textiles
4	Wood and wood products
5	Leather and leather products
6	Rubber and plastic products
7	Chemical and chemical products
8	Non-metallic mineral products
9	Basic metals, Alloys and metal products
10	Machinery and Machine tools
11	Transport equipment and parts
12	Other Miscellaneous manufacturing industries

Table 3.1 shows that each industry is different from the other. The textile industry is entirely different from the steel industry or the power industry in its product and process.

These industries can be classified on the basis of the business cycle, i.e. classified according to their reactions to the different phases of the business cycle. They are classified into growth, cyclical, defensive and cyclical growth industry.

- **Growth industry:** The growth industries have special features of high rate of earnings and growth in expansion, independent of the business cycle. The expansion of the industry mainly depends on the technological change. For **example**, in spite of the recession in the Indian economy in 1997–98, there was a spurt in the growth of information technology industry. It defied the business cycle and continued to grow. Likewise, in every phase of the history certain industries like colour televisions, pharmaceutical and telecommunication industries have shown remarkable growth.

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Cyclical growth industry: This is a new type of industry that is cyclical and at the same time growing

- **Cyclical industry:** The growth and the profitability of the industry move along with the business cycle. During the boom period they enjoy growth and during depression they suffer a set back. For **example**, the white goods like fridge, washing machine and kitchen range products command a good market in the boom period and the demand for them slackens during the recession.
- **Defensive industry:** Defensive industry defies the movement of the business cycle. For **example**, food and shelter are the basic requirements of humanity. The food industry withstands recession and depression. The stocks of the defensive industries can be held by the investor for income earning purpose. They expand and earn income in the depression period too, under the government's umbrella of protection and are counter- cyclical in nature.
- **Cyclical growth industry:** This is a new type of industry that is cyclical and at the same time growing. For **example**, the automobile industry experiences periods of stagnation, decline but they grow tremendously. The changes in technology and introduction of new models help the automobile industry to resume their growth path.

Industry life cycle

The industry life cycle theory is generally attributed to Julius Grodensky. The life cycle of the industry is separated into four well-defined stages such as:

(i) Pioneering stage
(ii) Rapid growth stage
(iii) Maturity and stabilization stage
(iv) Declining stage

(i) Pioneering stage: The prospective demand for the product is promising in this stage and the technology of the product is low. The demand for the product attracts many producers to produce the particular product. There would be severe competition and only fittest companies survive this stage. The producers try to develop brand name, differentiate the product and create a product image. This would lead to non-price competition too. The severe competition often leads to the change of position of the firms in terms of market shares and profit. In this situation, it is difficult to select companies for investment because the survival rate is unknown.

(ii) Rapid growth stage: This stage starts with the appearance of surviving firms from the pioneering stage. The companies that have withstood the competition grow strongly in market share and financial performance. The technology of the production would have improved resulting in low cost of production and good quality products. The companies have stable growth rate in this stage and they declare dividend to the shareholders. It is advisable to invest in the shares of these companies. The pharmaceutical industry has improved its technology and the top companies in this sector are giving dividend to the shareholders. Likewise, power industry and telecommunication industry can be cited as examples of expansion stage. In this stage, the growth rate is more than the industry's average growth rate.

(iii) Maturity and stabilization stage: In the stabilization stage, the growth rate tends to moderate and the rate of growth would be more or less equal to the industrial growth rate or the gross domestic product growth rate. Symptoms of obsolescence may appear in the technology. To keep going, technological innovations in the production process and products should be introduced. The investors have to closely monitor the events that take place in the maturity stage of the industry.

(iv) Declining stage: In this stage, demand for the particular product and the earnings of the companies in the industry decline. Now-a-days very few consumers demand black and white television sets. In fact they are not even manufactured. Innovation of new products and changes in consumer preferences lead to this stage. The specific feature of the declining stage is that, even in the boom period, the growth of the industry would be low and decline at a higher rate during the recession. It is better to avoid investing in the shares of the low growth industry even in the boom period. Investment in the shares of these types of companies leads to erosion of capital.

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Factors to be considered

Apart from industry life cycle analysis, the investor has to analyse some other factors too. They are as follows:

(i) Growth of the industry
(ii) Cost structure and profitability
(iii) Nature of the product
(iv) Nature of the competition
(v) Government policy
(vi) Labour
(vii) Research and development

(i) Growth of the industry: The historical performance of the industry in terms of growth and profitability should be analysed. Industry-wise growth is published periodically by the Centre for Monitoring Indian Economy. The past variability in return and growth in reaction to macro economic factors provide an insight into the future. Even though history may not repeat in the exact manner, looking into the past growth of the industry, the analyst can predict the future. The information technology industry has witnessed a tremendous growth in the past so also the scrip prices of the IT industry.

(ii) Cost structure and profitability: The cost structure, that is the fixed and variable cost, affects the cost of production and profitability of the firm. In the case of oil and natural gas industry and iron and steel industry, the fixed cost portion is high and the gestation period is also lengthy. Higher the fixed cost component, greater sales volume is required to reach the firm's break even point. Once the break even point is reached and the production is on the track, the profitability can be increased by utilizing the capacity to full. Once the maximum capacity is reached, again capital has to be invested in the fixed equipment. Hence, lower the fixed cost, adjustability to the changing demand and reaching the break even points are comparatively easier.

(iii) Nature of the product: The products produced by the industries are demanded by the consumers and other industries. If industrial goods like pig iron, iron sheet and coils are produced, the demand for them depends on the construction industry. Likewise, textile machine tools industry produces tools for the textile industry and the entire demand depends upon the health of the textile industry. Several such examples can be cited. The investor has to analyse the condition of related goods producing industry and the end user industry to find out the demand for industrial goods.

In the case of consumer goods industry, the change in the consumers' preference, technological innovations and substitute products affect the demand. A simple example is that the demand for the ink pen is affected by the ball point pen with the change in the consumer preference towards the easy usage of pen.

(iv) Nature of the competition: Nature of competition is an essential factor that determines the demand for the particular product, its profitability and the price of the concerned company scrip. The supply may arise from indigenous producers and multinationals. In the case of detergents, it is produced by indigenous manufacturers and distributed locally at a competitive price. This poses a threat to the company made products. The multinationals are also entering into the field with sophisticated product process and better quality product. Now the companies' ability to withstand the local as well as the multinational competition counts much. If too many firms are present in the organized sector, the competition would be severe. The competition would lead to a decline in the price of the product. The investor, before investing in the scrip of a company, should analyse the market share of the particular company's product and should compare it with the top five companies.

(v) Government policy: The government policies affect the very nerve of the industry and the effects differ from industry to industry. Tax subsidies and tax holidays are provided for export oriented products. Government regulates the size of the production and the pricing of certain products. The sugar, fertilizer and pharmaceutical industries are often affected by the inconsistent government policies. Control and decontrol of sugar price affect the profitability of the sugar industry. In some cases entry barriers are placed by the government. In the airways, private corporates are permitted to operate the domestic flights only. When selecting an industry, the government policy regarding the particular industry should be carefully evaluated. Liberalization and delicensing have brought immense threat to the existing domestic industries in several sectors.

(vi) Labour: The analysis of labour scenario in a particular industry is of great importance. The number of trade unions, and their operating mode, has impact on the labour productivity and modernization of the industry. Textile industry is known for its militant trade unions. If the trade unions are strong and strikes occur frequently, it would lead to fall in the production. In an industry of high fixed cost, the stoppage of production may lead to loss. When trade unions oppose the introduction of automation, in the product market the company may stand to lose with high cost of production. The unhealthy labour relationship leads to loss of customers' goodwill too.

Skilled labour is needed for certain industries. In the case of Indian labour market, even in computer technology or in any other industry skilled and well-qualified labour is available at a cheaper rate. This is one of the many reasons attracting the multinationals to set up companies in India.

(vii) **Research and development:** For any industry to survive the competition in the national and international markets, product and production process have to be technically competitive. This depends on the R&D in the particular company or industry. Economies of scale and new market can be obtained only through R&D. The percentage of expenditure made on R&D should be studied diligently before making an investment.

Pollution standards

Pollution standards are very high and strict in the industrial sector. For some industries it may be heavier than others; for example, in leather, chemical and pharmaceutical industries the industrial effluents are more.

SWOT analysis

The above-mentioned factors themselves would become strength, weakness, opportunity and threat (SWOT) for the industry. Hence, the investor should carry out a SWOT analysis for the chosen industry. Take for instance, increase in demand for the industry's product becomes its strength, presence of numerous players in the market, i.e. competition becomes the threat to a particular company in the respective industry. The progress in the research and development in that particular industry is an opportunity and entry of multinationals in the industry and cheap imports of the particular products are threat to that industry. In this way, the factors have to be arranged and analysed. To make the industry analysis more explanatory it has been carried out on the pharmaceutical industry and SWOT analysis results are also given.

Case Study

Pharmaceutical Industry

Growth of the industry: The industry has witnessed healthy growth in the recent past and investment in pharmaceutical industry is continuing. The product output is also increasing and operational and business management efficiency also seems to have improved.

Structure of the industry: The pharmaceutical industry adopts high technology and produces high value-added products. The process is very complex in nature. The processes are classified into primary and secondary. The primary process requires uninterrupted power supply, maintaining of conditions under which the molecules react and yield a new product, excellent manufacturing conditions and well-trained personnel. Specific plants cost less but they have the risk of obsolescence. Multipurpose plants are expensive and have no risk of obsolescence but they have the risk of cross contamination. The secondary process is the conversion of bulk drugs into formulations. The secondary process is not much technology intensive and has low capital cost. Hence, there are many players in the market.

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Nature of the product: The products of the pharmaceutical industry are broadly classified into bulk drugs, formulations and intravenous fluids. Bulk drugs include Ciproflaxacin, Ibuprofen, Ranitidine, Ethan-butol, etc. The major manufacturers of the products are Ranbaxy, Cipla, Cadilla, Dr. Reddys' Lab and Lupin. Some companies manufacture formulations from bulk drugs and market them under brands. Companies also manufacture formulations for other companies. Some of the companies in the formulation segment are Ranbaxy, Cipla, Wockhardt and Lupin.

Intravenous fluids are preparations which aid in quick replenishment of body fluids. Bulk drugs and formulations companies produce intravenous fluids also. The formulations are produced by firms from all over the country. Andhra Pradesh stands first in the production of bulk drugs.

Demand and status of industry: The potential for growth of this industry is enormous. The following factors determine the rising demand for pharmaceuticals:

- The increasing population of more than a billion
- Growing income
- Demand for quality healthcare service
- Increasing demand for new medicines for cure of lifestyle diseases
- Changing lifestyle leading to changing disease patterns

More than 85 per cent of the formulations produced in India are sold in the domestic market. Although certain life saving formulations continue to be imported by the multinationals and marketed in the country, India is largely self-sufficient as far as formulations are concerned. The overall size of the domestic formulations market is more than ₹160 billion and continuously growing at more than 10 per cent per annum.

From being non-existent in the 1960s, the industry has now become major provider of healthcare products, meeting almost 95 per cent of the country's pharmaceuticals needs.

The Indian pharmaceutical industry ranks very high in the third world, not just in terms of technology and quality but also the range of medicines manufactured.

India's US$ 9.4 billion pharmaceutical industry is growing at the rate of 14 percent per year.

It is one of the largest and most advanced among the developing countries.

2004	-	8.2%
2005	-	8.7%
2006	-	9.4%
2007	-	10.1%
2008	-	10.8%

Source: http://www.cci.in/pdf/surveys_reports/indias_pharmaceutical_industry.pdf

There are 74 U.S. FDA-approved manufacturing facilities in India. Clearly the emphasis has shifted from improvising in terms of processes, to discovering new drugs and indulging in research. Indian pharmaceutical firms are setting up their own R&D setups and are also collaborating with the research laboratories like CDRI and IICT.

Competition: The industry is having 2400 players within the organized sector and around 15,000 in small-scale sector. The low entry barriers,

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government's encouragement given to small sector units and low capital cost are the reason for the presence of large number of units in the pharmaceutical sector. This has lead to price crash in the bulk drug.

Apart from internal competition, the industry is facing international competition too. There is a large import of bulk drugs from China. The Chinese products are a significant competitor for the Indian pharmaceutical industry. Multinational corporations like Pfizer, Abbot labs and Novartis also pose threat to the local producers.

Government policy: The drug companies operate in a highly politicized environment. The product development, prices, safety are regulated by the government. The pharmaceutical industry functions under the Drug Price Control Order (DPCO). The prices of drugs are regulated to make them available to the masses at affordable prices. The DPCO is issued from time to time to keep the policy in tune with the changing demands.

The Patent Law in India provides patent only for process and there is no product patent. But, with signing of GATT, India is required to amend the Patent Law. Once the product patent comes into force, the reverse engineering route to introduce new molecules will not be available to Indian companies.

Research and development: The average sum spent by the 15 largest Indian pharmaceutical companies for R&D is around 2 per cent of turnover. This is drastically low and research is mainly concentrated towards the area of process development rather than on new molecular searching.

Strength

- Despite economic slow down, the industry registered double digit growth rate.
- Indian pharmaceutical market is growing at 14 per cent
- Net exporter of bulk drugs and formulations
- Low cost in process development and R&D
- Third largest scientific pool in the world

Weakness

- Decline in plan investment in medical and public health
- Only three out of ten Indians have access to allopathic drugs
- Various price controls

Opportunity

- With increase in purchasing power, health care expenditure would increase.
- Non-Japan Asia's share of world health care spends will double.
- Patent law will lead to consolidation of industry.

Threat

- Fall in the price of bulk drugs and imports from China.
- Sixty major products may lose patent protection.
- Ambiguity regarding the timing and content of the Indian Patent Act amendment.

3.2.3 Company Analysis and its Tools

In the company analysis, the investor assimilates the several bits of information related to the company and evaluates the present and future values of the stock. The risk and return associated with the purchase of the stock is analysed to take better investment decisions. The valuation process depends upon the investors' ability to elicit information from the relationship and inter-relationship among the company related variables. The present and future values are affected by a number of factors and they are given in Figure 3.1.

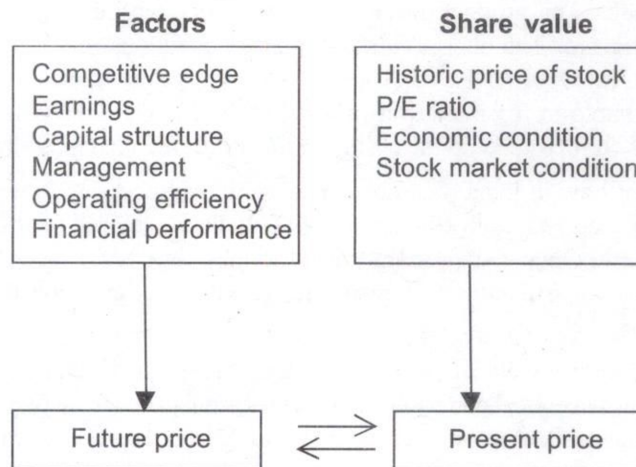


Fig. 3.1 Factors that Affect Present and Future Values

The competitive edge of the company

Major industries in India are composed of hundreds of individual companies. In the information technology industry even though the number of companies is large, few companies like Tata Infotech, Satyam computers, Infosys, NIIT, etc., control the major market share. Likewise, in all industries, some companies rise to the position of eminence and dominance. The large companies are successful in meeting the competition. Once the companies obtain the leadership position in the market, they seldom lose it. Over the time they would have proved their ability to withstand competition and to have a sizeable share in the market. The competitiveness of the company can be studied with the help of

- **The market share:** The market share of the annual sales helps to determine a company's relative competitive position within the industry. If the market share is high, the company would be able to meet the competition successfully. In the information technology industry, NIIT and Tata Infotech topped the list in terms of sales in 1997. While analysing the market share, the size of the company also should be considered because the smaller companies may find it difficult to survive in the future. The leading companies of today's market will continue to lead at least in the near future. The companies in the market should be compared with like product groups; otherwise, the results will be misleading. A software company should be compared with other software companies to select the best in that industry.
- **Growth of sales:** The company may be a leading company, but if the growth in sales is comparatively lower than another company, it indicates the possibility of

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the company losing the leadership. The rapid growth in sales would keep the shareholder in a better position than one with the stagnant growth rate. The company of large size with inadequate growth in sales will not be preferred by the investors. Growth in sales is usually followed by the growth in profits. Investor generally prefers size and the growth in sales because the larger size companies may be able to withstand the business cycle rather than the company of smaller size.

The growth in sales of the company is analysed both in rupee terms and in physical terms. Physical term is very essential because it shows the growth in real terms. The rupee term is affected by the inflation. Companies with diversified sales are compared in rupee terms and percentage of growth over time.

- **Stability of sales:** If a firm has stable sales revenue, other things being remaining constant, it will have more stable earnings. Wide variation in sales leads to variations in capacity utilization, financial planning and dividend. Periodically, all the financial newspapers provide information about the market share of different companies in an industry. The fall in the market share indicates the declining trend of the company, even if the sales are stable in absolute terms. Hence, the stability of sales also should be compared with its market share and the competitors' market shares.

Sales forecast

Company may be in a superior position commanding more sales both in monetary terms and physical terms, but the investor should have an idea whether it will continue in future, or not. For this purpose, the forecast of sales has to be done. He can forecast the sales in different ways.

1. The investor can fit a trend line either linear or non-linear, whichever is suitable.
2. Historical percentage of company sales to the industry sales can be analysed. Even simple least square technique could be used to find out the function $C_s = f(I_s)$ i.e.

   C_s - Company sales;

   I_s - Industry sales.
3. The sales growth can be compared with the macro economic variables like gross domestic product, per capita income and population growth.
4. The different components of demand for the company's product have to be analysed because the demand may arise from different sources. For some products, the demand may be from the consumers as well as from the industries. For **example**, steel and petroleum products are demanded by consumers and industries.
5. The demand for the substitutes and competitors' product also should be analysed using least square techniques.

Earnings of the company

Sales alone do not increase the earnings but the costs and expenses of the company also influence the earnings of the company. Further, earnings do not always increase with the increase in sales. The company's sales might have increased but its earnings

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per share may decline due to the rise in costs. The rate of change in earnings differs from the rate of change of sales. Sales may increase by 10 per cent in a company but earnings per share may increase only by 5 per cent. Even though there is a relationship between sales and earnings, it is not a perfect one. Sometimes, the volume of sales may decline but the earnings may improve due to the rise in the unit price of the article. Hence, the investor should not depend only on the sales, but should analyse the earnings of the company.

The income for the company is generated through operating sources and non-operating sources. The sources of operating income vary from industry to industry. For the service industry, no tangible product is involved and income is generated through sale of services. Take the case of commercial bank; its income is the interest on loans and investments. Interest income is referred to operating income. But in the case of industries producing tangible goods, earnings arise from the sale of goods.

The companies, in addition to the revenue from sales, may get revenue from other sources too. The non-operating income may be generated from interest from bonds, rentals from lease, dividends from securities and sale of assets. The investor should analyse the income source diligently whether it is from the sale of assets or it is from investments. Sometimes earning per share may seem to be attractive in a particular year but in actual case the revenue generated through sales may be comparatively lower than in the previous year. The earnings might have been generated through the sale of assets. The investor should be aware that income of the company may vary due to the following reasons:

- Change in sales
- Change in costs
- Depreciation method adopted
- Depletion of resources in the case of oil, mining, forest products, gas etc.
- Inventory accounting method
- Replacement cost of inventories
- Wages, salaries and fringe benefits
- Income taxes and other taxes

Capital structure

The equity holders' return can be increased manifold with the help of financial leverage, i.e. using debt financing along with equity financing. The effect of financial leverage is measured by computing leverage ratios. The debt ratio indicates the position of the long-term and short-term debts in the company finance. The debt may be in the form of debentures and term loans from financial institutions.

Preference shares

In the early days, the preference share capital was never a significant source of capital. At present, many companies resort to preference shares. The preference shares induct some degree of leverage in finance. The leverage effect of the preference shares is comparatively lesser than the debt because the preference share dividends are not tax deductible. If the portion of preference share in the capital is larger, it tends to create instability in the earnings of the equity shares when the earnings of the company fluctuate.

Sometimes the preference share may be convertible preference share. In that case, it dilutes the earnings per share. So the investor should look into the preference share component of the capital structure.

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Debt

Long-term debt is an important source of finance. It has the specific benefit of low cost of capital because interest is tax deductible. Debt provides leverage to the business. Leverage means to use fixed cost, i.e., is the interest to be paid on the debt to increase the profitability of the business. The shareholders benefit if the company uses debt as it is a cheaper source of finance because the rate of interest is fixed and lower than the divided rate expected by the shareholder. Moreover the interest is tax deductible. The business has to be careful in the extent debt is used. It should not be high that the company is not able to repay the interest if the amount of debt increases. During the boom period the positive side of the leverage effect increases the earnings of the share holders. At the same time, during recession the leverage effect inducts instability to bankruptcy. Hence, it is important to limit the debt component of the capital to a reasonable level. The limit depends on the firm's earning capacity and its fixed assets.

(i) **Earnings limit of debt:** The earnings determine whether the debt is excessive or not. The earnings indicate the probability of insolvency. The ratio used to find out the limit of the debts is the interest coverage ratio i.e. the ratio of net income after taxes to interest paid on debt. The ratio shows the firm's ability to pay the interest charges, the number of times interest is covered by earnings.

(ii) **Asset limit to debt:** This asset limit is found out by fixed assets to debt ratio. The financing of fixed assets by the debt should be within a reasonable limit. For industrial units, the recommended ratio level is below 0.5.

Management

Good and capable management generates profit to the investors. The management of the firm should efficiently plan, organize, actuate and control the activities of the company. The aim of the management is to achieve the goals of the company for the benefit of the equity holder, public and employees. If the objectives of the company are achieved, investors will have a profit. A management that ignores profit does more harm to the investors than one that over emphasizes it.

Management can only be fruitful to the organization if able managers are employed. An able manager is one who has the ability to analyse the situation and get things done accordingly. A manager should be able to judge the situation and make decisions appropriately. Since these traits are difficult to measure, managerial performance is evaluated against setting and accomplishing verifiable objectives. However, if an investor wants to verify the ability of management, he can analyse the management ability of the organization on the basis of the following criteria:

(i) Thorough background check on the organization and its top-level employees.

(ii) Reviewing past records of the organization

(iii) Check the market shares of the organization whether they are ahead of their competition

(iv) The company's ability to expand

(v) Efficient production by proper utilization of plan and machinery

(vi) Financial situation of the company

(vii) Functional ability of the management

(viii) Organization's adaptability to scientific management and quality control techniques

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Operating efficiency: Operational efficiency is the capability of a company to deliver products or services to its customers in the most cost-effective manner possible without compromising on the high quality of its products, service and support



Leverage: Leverage means the use of a lever to raise a heavy object with a small force.

Operating efficiency

Operational efficiency is the capability of a company to deliver products or services to its customers in the most cost-effective manner possible without compromising on the high quality of its products, service and support. The operating efficiency of a company directly affects the earnings of a company. An expanding company that maintains high operating efficiency with a low break-even point earns more than the company with high break-even point. If a firm has stable operating ratio, the revenues also would be stable. Efficient use of fixed assets with raw materials, labour and management would lead to more income from sales. This leads to internal fund generation for the expansion of the firm. A growing company should have low operating ratio to meet the growing demand for its product.

Operating leverage

If the firm's fixed cost is high in the total cost, the firm is said to have a high degree of operating leverage. **Leverage** means the use of a lever to raise a heavy object with a small force. High degree of operating leverage implies, other factors being held constant, a relatively small change in sales result in a large change in return on equity. This can be explained with the help of the following example.

Example: Let us take firms A and B. The firm A has relatively small amount of fixed charges say, ₹ 40,000. Firm A would not have much automated equipment, so its depreciation and maintenance costs are low. The variable cost per cent is higher than it would be if the firm used more automoted equipments. In the other case, firm B has high fixed costs, ₹ 1,20000. Here, the firm uses automated equipment (with which one operator can turn out many units at the same labour cost) to a much larger extent. The break-even occurs at 40,000 units in firm A and 60,000 units in firm B. The selling price (P) is ₹ 4, the variable cost is ₹ 3 for firm A and ₹ 2 for firm B per unit.

The break-even occurs when ROE (return on equity) = 0, and hence, when earnings before interest and taxes (EBIT) = 0.

$$\text{EBIT} = 0 = PQ - VQ - F$$

Here, P is the average sales price per unit of output, Q is units of output, V is the variable cost per unit, and F is the fixed operating costs.

The break-even quantity is $= \frac{F}{P-V}$

For Firm $A = \frac{₹40,000}{₹4 - ₹3} = 40,000$ units

Firm $B = \frac{₹1,20,000}{₹4 - ₹2} = 60,000$ units

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Financial statement: Financial statement analysis is the study of a company's financial statement from various viewpoints

To a large extent, operating leverage is determined by technology. For **example**, telephone companies, iron and steel companies, and electric utilities have heavy investments in fixed assets leading to high fixed costs and operating leverage. On the other hand, cosmetics companies and consumer goods producing companies may need significantly lower fixed costs, and hence lower operating leverage.

The investor should understand the operating leverage of the firm because the firm with high operating leverage is affected much by the cyclical decline. The operating efficiency of the firm determines the profit expectation of the company.

3.2.4 Financial Analysis

The best source of financial information about a company is its own financial statements. This is a primary source of information for evaluating the investment prospects in the particular company's stock. **Financial statement** analysis is the study of a company's financial statement from various viewpoints. The statement gives the historical and current information about the company's operations. Historical financial statement helps to predict the future. The current information aids to analyse the present status of the company. The two main statements used in the analysis include:

- Balance sheet
- Profit and loss account

Statements used in the analysis

1. The balance sheet

The balance sheet shows all the company's sources of funds (liabilities and stockholders' equity) and uses of funds at a given point of time. The balance sheet can either be in the horizontal form or vertical form; Tables 3.2 and 3.3 show the balance sheet of Sky Company in horizontal and vertical form respectively.

Table 3.2 *Balance Sheet of Sky Ltd as on 31st March, 2009*

In Horizontal form (Rs Lakhs)

Liabilities	2009	2008	Assets	2009	2008
Share capital:			Fixed assets less		
Equity	10,000	20,000	Depreciation	1,20,000	1,10,000
Preference	20,000	10,000	Current assets:		
Reserves and surplus	30,000	30,000	Inventories	44,000	40,000
Profit Loss account	49,825	40,000	Sundry debtors	33,025	30,000
Loan funds:					
12% Debentures	38,000	40,000	Marketable	10,800	15,000
Term loans	19,000	20,000	securities		
Current liabilities:					
Bills payable	9,000	8,000	Cash	8,000	5,000
Sundry creditors	15,000	12,000			
Other current liabilities	25,000	20,000			
	2,15,825	2,00,000		2,15,825	2,00,000

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Table 3.3 *Vertical form ₹in Lakhs*

Balance Sheet as on 31 March, 2009			
I. Sources of funds			
(1) Shareholders' fund:			
(a) Equity capital			20,000
(b) Preference capital	10,000		
(c) Reserves & surplus	30,000		
(d) P/L account	49,825		1,09,825
(2) Loan funds:			
(a) 12% Debentures	38,000		
(b) Term loans	19,000		57,000
Total			1,66,825
II. Application of funds			
(1) Fixed assets			1,20,000
(2) Current assets:			
(a) Inventories	44,000		
(b) Sundary debtors	33,025		
(c) Securities	10,800		
(d) Cash	8,000	95825	
(3) Less: Current liabilities			
(a) Bills payable	9,000		
(b) Sundry creditors		15,000	
(c) Other current liabilities	25,000	49,000	
(d) Net Working capital			46,825
Total			1,66,825

The balance sheet provides an account of the capital structure of the Sky company. The net worth and the outstanding long-term debt are known from the balance sheet. The debt has certain advantages in terms of cost and market acceptability. The use of debt creates financial leverage beneficial or detrimental to the shareholders depending on the size and stability of earnings. If revenues are stable and certain, a large amount of debt can be carried and it is beneficial to the shareholder. If the earnings fluctuate, the debt should below in the capital structure, so that the payment of interest may not be detrimental to the shareholders. It is better for the investor to avoid a company with excessive debt component in its capital structure. From the balance sheet, liquidity position of the company can also be assessed with the information on current assets and current liabilities. The overall ability to pay its short-term obligations can be found out.

2. The profit and loss account

Analysis of the financial condition of the company requires a report on the flow of funds too. The income statement reports the flow of funds from business operations that take place in between two points of time. It lists down the items of income and expenditure. The difference between the income and expenditure represents profit or loss for the period. It is also called income and expenditure statement. Profit and loss account of the Sky Ltd. is given in Table 3.4. The investor should be aware of the limitations of the financial statements.

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Limitations of financial statements

The limitations of financial statements are as follows:

1. The financial statements contain historical information. This information is useful; but an investor should be concerned more about the present and future.
2. Financial statements are prepared on the basis of certain accounting concepts and conventions like revenue realization, cost principle, match concept, principle of full disclosure, principle of dual aspect etc. An investor should know them to understand the fundamental being used to make financial statements.
3. The statements contain only information that can be measured in monetary units. For example, the loss incurred by a firm due to flood or fire is included because it can be expressed in monetary terms. The loss incurred by the company due to the loss of reputation is not given in the statement because it cannot be measured in monetary units.
4. Sometimes management may resort to manipulation of data and window dressing. This can be carried out by
   (a) Method of charging depreciation
   (b) Valuation of inventory
   (c) Revaluation of fixed asset
   (d) Changing the accounting year

An investor should scrutinize the financial statements to find out the manipulations, if any. The auditors' report and notes to the balance sheet give vital clue to the investor in this regard. Analysis of financial statements should be undertaken only after nullifying the effects of any such manipulation.

Analysis of financial statements

The analysis of financial statements reveals the nature of relationship between income and expenditure, and the sources and application of funds. The investor determines the financial position and the progress of the company through analysis. The investor is interested in the yield and safety of his capital. He cares much about the profitability and the management's policy regarding the dividend. Towards this end, he can use the following simple analysis:

(i) **Comparative financial statement:** In the comparative statement, balance sheet figures are provided for more than one year. The comparative financial statement provides time perspective to the balance sheet figures. The annual data are compared with similar data of previous years, either in absolute terms or in percentages.

(ii) **Trend analysis:** Here percentages are calculated with a base year. This would provide insight into the growth or decline of the sale or profit over the years. Sometimes sales may be increasing continuously, and the inventories may also be rising. This would indicate the loss of market share of the particular company's product. Likewise, sales may have an increasing trend but profits may remain the same. Here, the investor has to look into the cost and management efficiency of the company.

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(iii) **Common size statement comparison:** Common size balance sheet shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. In income statements, sales figures are assumed to be 100 per cent and all other figures are expressed as a percentage of sales. In balance sheet, the total of assets is taken as 100 per cent and all other figures are expressed as a percentage of total assets. This type of statement is called as the common size statement as it allows comparison to be made between two different size firms belonging to the same industry. For a same company over the years, common size statement can be prepared. Table 3.5 gives the common size statement of the Sky Ltd.

(iv) **Fund flow analysis:** The balance sheet gives a static picture of the company's position on a particular date. It does not reveal the changes that have occurred in the financial position of the unit over a period of time. The investor should know;

(a) How are the profits utilized?

(b) Financial source of dividend

(c) Source of finance for capital expenditures

(d) Source of finance for repayment of debt

(e) How the sale proceeds of the fixed assets will be treated

(f) Use of the proceeds of the share or debenture issue or fixed deposits raised from public

These items of information are provided in the funds flow statement. It is a statement of the sources and applications of funds. It highlights the changes in the financial condition of a business enterprise between two balance sheet dates. The investor could see clearly the amount of funds generated or lost in operations. He could see how these funds have been divided into three significant uses like taxes, dividends and reserves. Moreover, the application of long-term funds towards the acquisition of current assets can be found out. This would reveal the real picture of the financial position of the company.

(v) **Cash flow statement:** The investor is interested in knowing the cash inflow and outflow of the enterprise. The cash flow statement is prepared with the help of balance sheet, income statement and some additional information. It can be either prepared in the vertical form or in the horizontal form. Cash flows related to operations and other transactions are calculated. The statement shows the causes of changes in cash balance between two balance sheet dates. With the help of this statement the investor can review the cash movements over an operating cycle. The factors responsible for the reduction of cash balances in spite of increase in profits or vice versa can be found out.

Example: The balance sheet and the profit and loss account of the Sky Ltd are given is Table 3.2. As an investor in the company's scrips, you can prepare

(a) Common size balance sheet

(b) Fund flow statement

(c) Cash flow statement, and analyse them.

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Table 3.4 *Profit and Loss Account of Sky Ltd as on 31 March 2009 (₹ in lakhs)*

Net sales		2,40,000
Less: Cost of goods sold*	1,40,000	
Selling expenses	35,000	
Administrative expenses	25,000	
Interest	8,350	2,08,350
Profit before tax		31,650
Less Income tax @ 50%		15,825
Profit after tax		15,825
Preference dividend		1,000
Net profit available to equity shareholders		14,825
Less: Dividend to equity shareholders		5,000
Retained earnings		9,825

*Cost of goods includes depreciation amount 10,000/-

Table 3.5 *Common size Balance sheet of Sky Ltd as on 31st March 2009 (₹ in lakhs)*

Particulars	**As on 31.03.2009**		**As on 31.03.2008**	
	Amount	**% total**	**Amount**	**% total**
Capital and Reserves				
Share capital	20,000	9.3	10,000	5.0
Preference capital	10,000	4.6	20,000	10.0
Reserves	30,000	13.9	30,000	15.0
P/L account	49,825	23.1	40,000	20.0
	1,09,825	50.9	50.0	
Long-term debt:				
12% Debentures	38,000	17.6	40,000	20.0
Term loans	19,000	8.8	20,000	10.0
	57,000	26.4	60,000	30.0
Current liabilities:				
Bills payable	9,000	4.1	8,000	4.0
Sundry creditors	15,000	7.0	12,000	6.0
Other current liabilities	25,000	11.6	20,000	10.0
	49,000	22.7	40,000	20.0
Total	2,15,825	100%	100,000	100%
Assets:				
Current assets:				
Cash	8,000	3.7	5,000	2.5
Investment	10,800	5.0	15,000	7.5
Debtors	33,025	15.3	30,000	15.0
Inventory	44,000	20.4	40,000	20.0
Total current assets	95,825	44.4	90,000	45.0
Fixed Assets:				
Gross fixed assets	2,40,000		2,20,000	
Less: Accumulated depreciation	1,20,000		1,10,000	
	1,20,000	55.6	1,10,000	55.0
Total	2,15,825	100%	2,00,000	100%

NOTES

Table 3.6

Statement of Changes in W.C.

Particulars	2008	2009	Change in W.C. Increase	Decrease
Current Assets				
Cash	5,000	8,000	3,000	
Investments (short-term)	15,000	10,800		4,200
Debtors	30,000	33,025	3,025	
Inventory	40,000	44,000	4,000	
Total Current Assets (CA)	90,000	95,825		
Current Liabilities				
Bills payable	8,000	9,000		1,000
Sundry creditors	12,000	15,000		3,000
Other current liabilities	20,000	25,000		5,000
Total Current Liabilities (CL)	40,000	49,000		
CA-CL	50,000	46,825	3,175	
			13,200	13,200

Fund Flow Statement (₹ in lakhs)

Sources		Uses	
Funds from operations	41,650	Purchase of fixed assets	20,000
Decrease in Working		Redemption of 12%	
Capital	3,175	Debentures	2,000
		Repayment of term loans	1,000
		Payment of Tax	15,825
		Payment of Pref.Dividend	1,000
		Payment of Equity Divi.	5,000
	44,825		44,825

Dr. Funds from Operations P & L App. a/c (₹ in lakhs)

To Depreciation	10,000	By Bal.b/d	40,000
To Income tax	15,825	(Opening Balance)	
To Pref.Dividend	1,000	By Funds from	
To Equity Dividend	5,000	operations	41,650
		(Balancing figure)	
To Balance c/d	49,825		
(Cl. bal.)			
	81,650		81,650

***Table** 3.7 Cash Flow Statement (₹ in lakhs)*

Sources		Uses	
Opening Balance of Cash	5,000	Increase in S. Debtors	3,025
		Increase in Inventory	4,000
Add:		Purchase of Fixed assets	20,000
Cash from operations	41,650	Redemption of 12%	
Decrease in Investments	4,200	Debentures	2,000
Increase in Bills payable	1,000	Repayment of term loans	1,000
Increase in Sundry Crs.	3,000	Payment of Income Tax	15,825
Increase in other		Payment of Pref.Dividend	1,000
Current liabilities	5,000	Payment of Equity	
		Dividend	5,000
			51,850
		Closing balance of cash	8,000
	59,850		59,850

Cash from Operations (₹ in lakhs)

Retained Earnings		9,825
Add:		
Non-cash/Non-operating expenditures		
Depreciation	10,000	
Income Tax	15,825	
Pref.Dividend	1,000	
Equity Dividend	5,000	31,825
Less:		41,650
Non-cash/Non-operating incomes		Nil
Cash from Profit		41,650

(a) The change in the capital components caused the fluctuations in the profit. The common size balance sheet reveals that there is a reduction in the long-term loans, while the current liabilities increased. The fixed assets have also increased.

(b) The fund flow statement shows that the majority of the fund is obtained from business operations. The funds are applied for uses like acquisition of fixed assets and redemption of debentures. Profit and working capital are sufficient to pay dividend and taxes.

(c) Cash flow statement indicates that the company is following the policy of sales on credit basis because the inventory and the sundry debtors have increased.

The statement of cash flow shows three main categories of cash inflows and cash outflows, namely: operating, investing and financing activities.

(a) **Operating activities** are the principal revenue generating activities of the enterprise.

(b) **Investing activities** include the acquisition and disposal of long term assets and other investments not included in cash equivalents.

(c) **Financing activities** are activities that result in change in the size and composition of the owner's capital (including Preference share capital in the case of a company) and borrowings of the enterprise.

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Financing activities: Financing activities are activities that result in change in the size and composition of the owner's capital (including Preference share capital in the case of a company) and borrowings of the enterprise

Format for Cash flow Statement for the year ended ....
As per Accounting Standard-3 (Revised)

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Statement of Cash Flows	
Cash Flow from Operating Activities	
Net Income	XXX,XXX
Adjustments to reconcile net income to net cash provided by operating activities:	
Depreciation and amortization	XX,XXX
Changes in other accounts affecting operations:	
(Increase)/decrease in accounts receivable	X,XXX
(Increase)/decrease in inventories	X,XXX
(Increase)/decrease in prepaid expenses	X,XXX
Increase/(decrease) in accounts payable	X,XXX
Increase/(decrease) in taxes payable	X,XXX
Net cash provided by operating activities	XXX,XXX
Cash Flow from Investing Activities	
Capital expenditures	(XXX,XXX)
Proceeds from sales of equipment	XX,XXX
Proceeds from sales of investments	XX,XXX
Investments in subsidiary	(XXX,XXX)
Net cash provided by investing activities	(XXX,XXX)
Cash Flow from Financing Activities	
Payments of long-term debt	(XX,XXX)
Proceeds from issuance of long-term debt	XX,XXX
Proceeds from issuance of common stock	XXX,XXX
Dividends paid	(XX,XXX)
Purchase of treasury stock	(XX,XXX)
Net cash provided by financing activities	(XX,XXX)
Increase (Decrease) in Cash	XX,XXX



Ratio analysis: Financial ratio provides numerical relationship between two relevant financial data

(vi) **Ratio analysis:** Ratio is a relationship between two figures expressed mathematically. Financial ratio provides numerical relationship between two relevant financial data. Financial ratios are calculated from the balance sheet and profit and loss account. The relationship can be either expressed as a percent or as a quotient. Ratios summarize the data for easy understanding, comparison and interpretation. Financial ratios may be divided into six groups. They are as follows:



Liquidity ratio: Liquidity means the ability of the firm to meet its short-term obligations

- **Liquidity ratio:** Liquidity means the ability of the firm to meet its short-term obligations. Current ratio and acid test ratio are the most popular ratios used to analyse the liquidity. The liquidity ratio indicates the liquidity in a rough fashion and the adequacy of the working capital. The ratios for the Sky Ltd are as follows:

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$= \frac{95825}{49000} = 1.96:1$$

$$\text{Acid test ratio} = \frac{\text{Current assets - Inventories}}{\text{Current liabilities}}$$

$$= \frac{51825}{49000} = 1.06:1$$

NOTES

For the current ratio the minimum value set is 1.33. Compared to that, the liquidity position of Sky Ltd. is favourable. The acid test ratio of 1.06 shows that the company is able to meet current liabilities. Yet, the company has to work out plans to reduce the inventory level a little below the present level.

- **Turnover ratios:** The turnover ratios show how well the assets are used and the extent of excess inventory, if any. These ratios are also known as activity ratios or asset management ratios. Commonly calculated ratios are sales to current assets, sales to fixed assets, sales to inventory, sales to receivables and turnover to total assets. Each ratio has a specific application. Sales to current asset ratio shows the utilization of the current assets and sales to fixed asset ratio indicates the fixed asset utilization. The sales to inventory ratio reflects the inventory management. The receivable to sales gives a view of the receivable management. The value of the calculated ratios for the Sky Ltd is as follows:

$$\text{Inventory turnover ratio} = \frac{\text{Net Sales}}{\text{Inventory}} = \frac{240000}{44000} = 5.45 : \text{times}$$

$$\text{Receivables turnover ratio} = \frac{\text{Net Sales}}{\text{Receivables}} = \frac{240000}{33025} = 7.27 : \text{times}$$

$$\text{Fixed asset turnover ratio} = \frac{\text{Net Sales}}{\text{Fixed asset}} = \frac{240000}{120000} = 2.1 \text{ times}$$

$$\text{Total assets turnover ratio} = \frac{\text{Net Sales}}{\text{Total assets}} = \frac{240000}{215825} = 1.1 : \text{times}$$

- **The leverage ratios:** The investors are generally interested to find out the debt portion of the capital. The debt affects the dividend payment because of the outflow of profit in the form of interest. The financial leverage affects the risk and return aspects of holding the shares. The total debt to total assets ratio indicates the percentage of borrowed funds in the firms' assets.

$$\text{Debt to asset ratio} = \frac{\text{Total debt}}{\text{Total assets}}$$

$$= \frac{57{,}000}{2{,}15{,}825} \times 100 = 26.4\%$$

It shows that 49 per cent of the assets owned by the Sky Ltd company is financed with borrowed money. The debt to equity ratio compares the creditors' funds with owners' funds.

$$\text{Debt to equity ratio} = \frac{\text{Total debt}}{\text{Net worth}}$$

$$= \frac{57{,}000}{1{,}09{,}825} = .97 : 1$$

It indicates that the creditors also have placed equal amount of money as that of the equity holders. A portion of the debt fund consists of interest free trade credit. Hence, the long-term debt should be compared with the net worth.

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The long-term debt to equity ratio specifically indicates the proportion of long-term borrowings.

$$\text{Long term debt to equity} = \frac{\text{Long term debt}}{\text{Networth}}$$

$$= \frac{57,000}{1,09,825} = 0.52:1$$

The long-term debt portion is comparatively lower than the net worth. Sky Ltd operations depend more on the owners' equity than on the borrowed funds.

- **Interest coverage ratio:** A ratio of 1.5 is often cited as the standard minimum level for a viable business. An interest-coverage ratio below 1 is an immediate indication that the company, regardless of its industry, is not generating sufficient cash to cover its interest payments.

  This shows how many times the operating income covers the interest payment.

$$\text{Interest coverage ratio} = \frac{\text{EBIT}}{\text{Interest}}$$

$$= \frac{40,000}{8,350} = 4.79:\text{times}$$

  The Sky Ltd's earnings before interest and tax are sufficient to service the debt to the extent of 4.79 times.

- **Profitability ratio:** Profitability ratios relate the firm's profit with factors that generate the profits. The investor is very particular in knowing net profit to sales, net profit to total assets and net profit to equity. The profitability ratios measure the overall efficiency of the firm.
- **Net profit margin ratio:** This ratio indicates the net profit per rupee of sales revenue.

$$\text{Net Profit Margin} = \frac{\text{PAT}}{\text{Sales}}$$

$$= \frac{15,825}{2,40,000} \times 100 = 7\%$$

  The net profit margin of the Sky Ltd company is 7 paise in a rupee sold.

- **Return on assets:** The return on asset measures the overall efficiency of capital invested in business.

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Total assets}}$$

$$= \frac{15,825}{2,15,825} \times 100 = 7.33\%$$

  For every rupee invested in assets, the yield is 7.33 per cent.

- **Return on equity:** Here, the net profit is related to the firm's capital.

$$\text{Return on equity} = \frac{\text{Net Profit}}{\text{Net worth}}$$

$$= \frac{15825}{109825} \times 100 = 14.4\%$$

The return on equity is 14.4 per cent. The return on assets and the return on equity will be identical if the company carries out all of its operations with owners' funds. The difference between the two ratios is caused by financial leverage. When both the ratios are compared, the ROE is greater than ROA. It indicates that the Sky Ltd has employed borrowed funds efficiently to lever the rate of return to the advantage of shareholders.

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- **Valuation ratios:** The shareholders are interested in assessing the value of the shares. The value of the share depends on the performance of the firm and the market factors. The performance of the firm in turn depends on a host of factors. Hence, the valuation ratios provide a comprehensive measure of the performance of the firm itself. In the subsequent section, some of the valuation ratios are dealt in detail.
- **Book value per share:** This ratio indicates the share of equity shareholders after the company has paid all its liabilities, creditors, debenture holders and preference shareholders. At the time of liquidation, the shareholder can know what remains after making all the payments. In ordinary time also it helps the shareholder to find out his real position in the company.

$$\text{Book value per share} = \frac{\text{Eqity share capital} + \text{Reserve}}{\text{Total number of equity shares outstanding}}$$

OR

$$= \frac{\text{Networth} - \text{Preference share capital}}{\text{Total number of equity shares outstanding}}$$

$$= \frac{50000\ (₹\text{ in lakhs})}{2000\ (\text{numbers in lakhs})}$$

$$= ₹25$$

Here, the book value of the share is 2.5 times higher than its par value of ₹10. When the book value of the share is higher than the par value, it is a healthy sign. The profits and accumulated reserves lead to high book value. Book value may be less for firms having long gestation period and when there are accumulated losses.

When the book value of the share is high, companies may issue bonus shares to the existing shareholders out of the reserves. Right issues also can bring down the book value of the share.

- **Dividend to market price:** Dividend is the regular income received by the shareholder. The shareholder would like to know the relationship between the market price and the dividend. Suppose 'A' company pays ₹ 4 per share and the market value is ₹ 50. Then



Dividend to market price: Dividend is the regular income received by the shareholder

$$\text{Dividend yield} = \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100$$

$$= \frac{4}{50} \times 100 = 8\%$$

Even though the 'A' company provides 40 per cent dividend its actual yield is low because of the high market price. Whenever companies plough back

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Earnings per share: Earnings per share are the earnings after tax divided by the number of common shares outstanding.

their profits to settle the loans or for expansion programme, the yield would be low. At the same time, if the company distributes profits to shareholders the yield may be high. This may not be a proper indicator. The earnings per share are treated as a better guide in investment decisions.

- **Earnings per share:** Earnings per share are the earnings after tax divided by the number of common shares outstanding.

$$\text{EPS} = \frac{\text{EAT}}{\text{Number of shares outstanding}}$$

Lerner and Carleton have given a model for the EPS.

$$\text{EPS} = \frac{(1-T)\ [R+(R-1)\ L/E]E}{\text{Number of common shares outstanding}}$$

EPS - Earnings per share

T - Effective tax rate (Tax exposure/EBT)

R - Before tax return on assets (EBIT/A)

I - Effective interest rate (Interest expense/liabilities)

L - Total liabilities

E - Equity

The model gives a comprehensive outlook of the earnings per share. According to the model, the earnings per share are affected by the following factors:

(a) Utilization of assets in the company
(b) Margin on sales
(c) Effective cost of the borrowed funds
(d) Debt-equity ratio
(e) Equity base of the company
(f) Effective tax rate paid by the company

- **Growth in earnings:** The growth in earnings also influences the value of the stock. The growth in earnings depends on the earnings retained and reinvested in the firm.
The rate of return on equity also influences the growth rate.

Growth rate = Retention rate × Return on equity = RR × ROE

The same can be rewritten as follows.

$$\text{Growth rate} = \text{RR} \times \frac{\text{Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Equity}} \times \frac{\text{Net income}}{\text{Sales}}$$

$$\text{RR} = \text{Retained earnings/Net income} = \frac{\text{RE}}{\text{NI}}$$

Substituting and rearranging we get

$$\text{Growth Rate} = \frac{RE}{NI} \times \frac{NI}{Sales} \times \frac{Sales}{TA} \times \frac{TA}{EQ} = \frac{RE}{EQ}$$

This analysis is known as Dupont analysis because it was popularized by Dupont company.

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- **Price earnings ratio:** One of the most common financial parameters used in the stock market is the price-earnings ratio (P/E). It relates the share price with earnings per share. Most of the news papers along with the stock price quotations give the P/E ratio too. The P/E ratio is the multiplying factor that the market is willing to offer to the company's future earnings. In the 'A' company's earnings per share is ₹ 6 and price ₹ 50, then:

$$\text{Price Earnings Ratio} = \frac{\text{Market price per share}}{\text{Earnings per share}}$$

$$= \frac{₹50}{₹6} = 8.33 \text{ times}$$

The P/E of 8.33 means that the market is prepared to pay ₹ 8. 33 for every rupee of future earnings. The past performance is the base for the estimate. High P/E ratio indicates high expectation of the market regarding the growth of future earnings of the company. The P/E ratio has links with other financial parameters like dividend payout, dividend growth rate and the cost of company's funds. Large dividend payouts, high dividend growth rates and low cost of funds will result in high P/E ratios.

The investors generally compare the P/E ratio of the company with that of the industry and market. A P/E ratio lower than industry means that the stock is underpriced. Investors should be careful in comparing the scrip's P/E with the industry's P/E because sometimes, the industry P/E may be high due to overheated market. In such a situation, the industry's P/E should be moderated to acceptable levels. The investor can also forecast the future P/E ratio and compare it with the present P/E to assess the extent of underpricing of the particular share. Forecast can be done by studying fundamental factors and applying statistical techniques using past P/E data. The comparison of the estimated P/E ratio with the actual P/E ratio leads to one of the following three conclusions:

1. If the current P/E ratio is larger than the E (P/E) ratio, the stock is overpriced. It is better to sell the shares before the fall in price.
2. If the current P/E ratio is smaller than the E (P/E) ratio, the stock is underpriced and it could be a best buy with the expectation of the rise in price.
3. If the current P/E ratio equals the E (P/E) ratio, the stock is correctly priced. No significant changes in prices are likely to occur.



Intrinsic value: The true economic worth of the share is its intrinsic value

- **Intrinsic value:** The true economic worth of the share is its intrinsic value. The fundamental analysts find out the intrinsic value of a share by using the following formula:

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Technical analysis: Technical analysis is a process of identifying trend reversals at an earlier stage to formulate the buying and selling strategy

Check Your Progress

1. What is the significance of demographic data?
2. List the bases for selecting economic indicators.
3. What are the special features of growth industries?
4. What are the stages of the life cycle of an industry?
5. Why is it necessary to understand the market share of the annual sales by a company?
6. How would you calculate the financial ratios?
7. What are the earnings per share?

Intrinsic value of a share = Normalized EPS × Expected P/E ratio

The expected P/E ratio can be found out by

$$E(P/E) = \frac{\text{Cash dividend}/E(EPS)}{\text{Discount rate} - \text{growth rate}} = \frac{D/E(EPS)}{K - g}$$

The numerator is:

Payout ratio = Cash dividend per share/Expected earnings per share = D/E (EPS)

To forecast the P/E, the analyst should have the following details:

- Stock's risk - adjusted discount rate (K)
- Growth rate (g)
- Cash dividend per share (D)
- Earnings per share (EPS)
- Pay out ratio (D/E)

The simple technique adopted by the analyst is as follows:

Intrinsic value = Average P/E ratio over the years × Present earnings per share

OR

= Average P/BV ratio over the years × Present book value per share

This calculation is based on the following assumptions:

1. The trend in the profitability of the immediate past and the present will continue to be the same.
2. The average P/E, P/BV and average earnings to equity ratio remain constant over a period of time.

3.3 TECHNICAL ANALYSIS: CONCEPTS AND TOOLS

Technical analysis is a process of identifying trend reversals at an earlier stage to formulate the buying and selling strategy. With the help of several indicators, they analyse the relationship between price-volume and supply-demand for the overall market and the individual stock. Volume is favourable on the upswing, i.e. the number of shares traded is greater than before and on the downside, the number of shares traded dwindles. If it is the other way round, trend reversals can be expected.

3.3.1 Assumptions

The assumptions are as follows:

1. The market value of the scrip is determined by the interaction of supply and demand.
2. The market discounts everything. Discount means if the news is good, the price of the securities will increase. However, if the news is bad, the prices will fall. The price of the security quoted represents the hopes, fears and inside information

received by the market players. Inside information regarding the issuing of bonus shares and right issues may support the prices. The loss of earnings and information regarding the forthcoming labour problem may result in fall in price. These factors may cause a shift in demand and supply, changing the direction of trends.

3. The market always moves in trend. Except for minor deviations, the stock prices move in trends. The price may create definite patterns too. The trend may be either increasing or decreasing. The trend continues for sometime and then it reverses.
4. Any layman knows the fact that history repeats itself. It is true to the stock market also. In the rising market, investors' psychology has up beats and they purchase the shares in greater volumes, driving the prices higher. At the same time, in the down trend, they may be very eager to get out of the market by selling them and thus plunging the share price further. The market technicians assume that past prices predict the future.

History

The technical analysis is based on the doctrine given by Charles H. Dow in 1884 in the *Wall Street Journal*. He wrote a series of articles in the *Wall Street Journal*. A.J. Nelson, a close friend of Charles Dow formalized the Dow Theory for economic forecasting. The analysts used charts of individual stocks and moving averages in the early 1920's. Later on, with the aid of calculators and computers, sophisticated techniques came into vogue.

Technical tools

Several tools are used for technical analysis important ones are being discussed in the following Sub-sections.

3.3.2 Dow Theory

Dow developed his theory to explain the movement of the indices of Dow Jones Averages. He developed the theory on the basis of certain hypotheses. The first hypothesis is that no single individual or buyer can influence the major trend of the market. However, an individual investor can affect the daily price movement by buying or selling huge quantum of particular scrip. The intermediate price movement also can be affected to a lesser degree by an investor.

His second hypothesis is that the market discounts every thing. Even natural calamities such as earthquake, plague and fire also get quickly discounted in the market. For example, the Pokhran nuclear tests affected the share market for a short while and then the market returned back to normalcy.

His third hypothesis is that the theory is not infallible. It is not a tool to beat the market, but provides a way to understand it better.

According to the Dow theory, the trend is divided into primary, intermediate and short-term trends. The primary trend may be the broad upward or downward movement that may last for a year or two. The intermediate trends are corrective movements, which may last for three weeks to three months. The primary trend may

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be interrupted by the intermediate trend. The short-term trend refers to the day-to-day price movement. It is also known as oscillations or fluctuations. These three types of trends are compared to tide, waves and ripples of the sea.

Trend

Trend is the direction of movement. The share prices can either increase or fall or remain flat. The three directions of the share price movements are called as rising, falling and flat trends. The point to be remembered is that share prices do not rise or fall in a straight line. Every rise or fall in price experiences a counter move. If a share price is increasing, the counter move will be a fall in price and vice-versa. The share prices move in a zigzag manner.

The trend lines are straight lines drawn connecting either the tops or bottoms of the share price movement. To draw a trend line, the technical analyst should have at least two tops or bottoms. Figure 3.2 shows the trend lines.

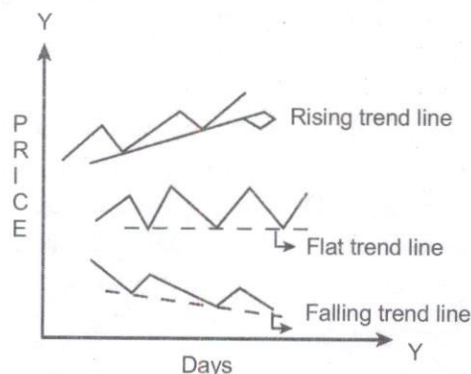


Fig. 3.2 Trend Lines

(i) **Trend reversal:** The rise or fall in share price cannot go on forever. The share price movement may reverse its direction. Before the change of direction, certain pattern in price movement emerges. The change in the direction of the trend is shown by violation of the trend line. Violation of the trend line means the penetration of the trend line. If a scrip price cuts the rising trend line from above, it is a violation of trend line and signals the possibility of fall in price. Likewise, if the scrip pierces the trend line from below, this signals the rise in price.

(ii) **Primary trend:** The security price trend may be either increasing or decreasing. When the market exhibits the increasing trend, it is called bull market. The bull market shows three clear-cut peaks. Each peak is higher than the previous peak. The bottoms are also higher than the previous bottoms. The reactions following the peak used to halt before the previous bottoms. The phases leading to the three peaks are revival, improvement in corporate profit and speculation. The revival period encourages more and more investors to buy scrips, their expectations about the future being high. In the second phase, increased profits of corporate would result in further price rise. In the third phase, prices advance due to inflation and speculation. Figure 3.3 gives the three phases of bull market.

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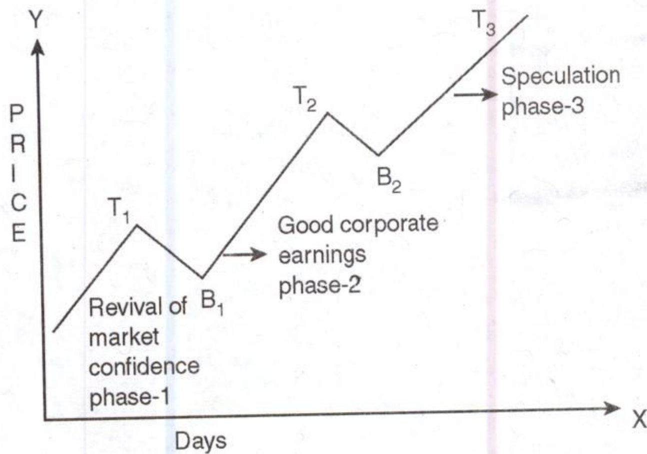


Fig. 3.3 Three Phases of Bull Market

The reverse is true with the bear market. Here, the first phase of fall starts with the abandonment of hopes. The chances of prices moving back to the previous high level seemed to be low. This would result in the sale of shares. In the second phase, companies are reporting lower profits and dividends. This would lead to selling pressure. The final phase is characterized by the distress sale of shares. During the bear phase of 1996, in the Bombay Stock Exchange, more than 2/3 of stocks were inactive. Most of the scrips were sold below their par values. Figure 3.4 shows the phases of the bear market. Here, the tops and bottoms are lower than the previous ones.

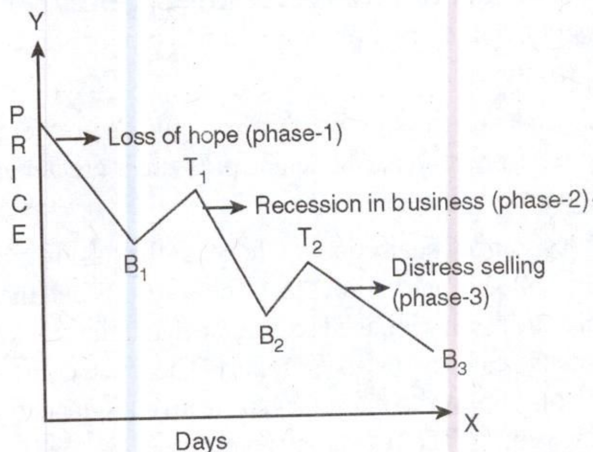


Fig. 3.4 Phases of the Bear Market

(iii) Secondary trend: The secondary trend or the intermediate trend moves against the main trend and leads to correction. In the bull market, the secondary trend would result in the fall of about 33-66 per cent of the earlier rise. In the bear market, the secondary trend carries the price upward and corrects the main trend. The correction would be 33 per cent to 66 per cent of the earlier fall. Intermediate trend corrects the overbought and oversold condition. It provides the breathing space to the market. Compared to the time taken for the primary trend, secondary trend is swift and quicker. Figure 3.5 shows the secondary movement.

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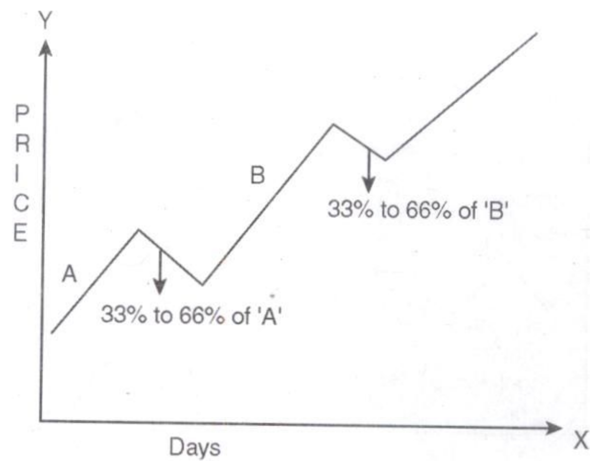


Fig. 3.5 The Secondary Movement

(iv) **Minor trends:** Minor trends or tertiary moves are called random wriggles. They are simply the daily price fluctuations. Minor trend tries to correct the secondary trend movement. It is better for the investors to concentrate on the primary or secondary trends than on the minor trends. The chartist plots the scrip's price or the market index each day to trace the primary and secondary trend.

3.3.3 Support and Resistance Levels

Anybody interested in technical analysis should know the support and resistance levels. A support level exists at a price where considerable demand for that stock is expected to prevent further fall in the price level. The fall in the price may be halted for the time being or it may result even in price reversal. In the support level, demand for the particular scrip is expected.

In the resistance level, the supply of scrip would be greater than the demand and further rise in price is prevented. The selling pressure is greater and the increase in price is halted for the time being.

Support and resistance usually occur whenever the turnover of a large number of shares tends to be concentrated at several price levels. When the stock touches a certain level and then drops, this is called resistance and if the stock reaches down to a certain level and then rises, there exists a support. The levels constantly switch from one to another, i.e. from support to resistance, or from resistance to support. Figures 3.6 and 3.7 show the support and resistance level.

This can be explained numerically; for example, if a scrip price hovers around ₹ 150 for some weeks, then it may rise and reach ₹ 210. At this point, the price halts and then falls back. The scrip keeps on falling back to around its original price ₹ 150 and halts. Then it moves upward. In this case, ₹ 150 becomes the support level. At this point, the scrip is cheap and investors buy it and demand makes the price move upward. Whereas ₹ 210 becomes the resistance level, the price is high and there would be selling pressure resulting in the decline of the price.

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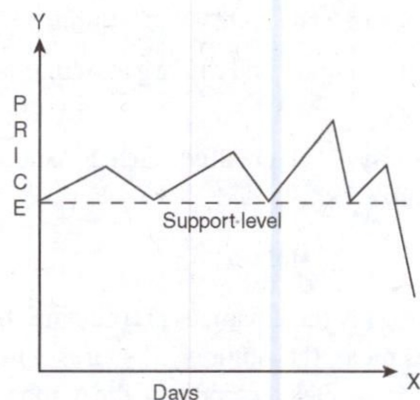


Fig. 3.6 The Support Level

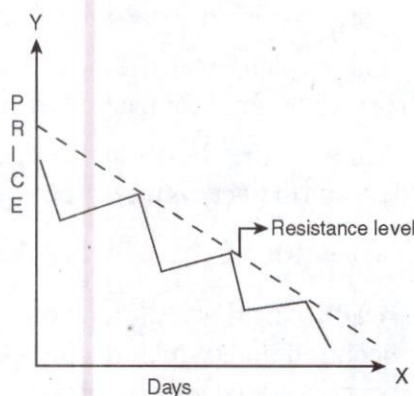


Fig. 3.7 The Resistance Level

If the scrip price reverses the support level and moves downward, it means that the selling pressure has overcome the potential buying pressure, signalling the possibility of a further fall in the value of the scrip. It indicates the violation of the support level and bearish market.

If the scrip penetrates the previous top and moves above, it is the violation of resistance level. At this point, buying pressure would be more than the selling pressure. If the scrip was to move above the double top or triple top formation, it indicates bullish market.

The support and the resistance levels need not be formed only on tops or bottoms. They can be on the trend lines or gaps of the chart. Gaps are defined as those points or price levels where the scrip has not changed hands. In the rising or falling price level, gaps are formed. If the prices are in the upward move and the high of any day is lower than the next day's low, the gap is said to have occurred. For example, if the high price of the Instant company's scrip on March 1st is ₹ 200 and on March 2nd low is 225, a gap is said to have occurred on the bar chart. This indicates that the stock is not traded between the level ₹ 200 and ₹ 225. This gap indicates further rise in price level. Likewise, in a falling price, a gap is formed if the low price on day 1 is higher than the high price of day 2. Suppose the low price on Monday is ₹ 150 and the high price on the Tuesday is ₹ 130, a gap is said to have occurred and indicates that there was no transaction between the level of ₹ 150 and ₹ 130.

Technical indicators are used to determine the direction of the overall market. The overall market movements affect the individual share price. Aggregate forecasting is considered to be more reliable than the individual forecasting. The indicators are price and volume of trade. The volume of trade is influenced by the behaviour of price.

3.3.4 Volume of Trade

Dow gave special emphasis on volume. Volume expands along with the bull market and narrows down in the bear market. If the volume falls with rise in price or vice-versa, it is a matter of concern for the investor and the trend may not persist for a longer time. Technical analyst used volume as an excellent method of confirming the trend. The market is said to be bullish when small volume of trade and large volume of trade follow the fall in price and the rise in price.

Large rise in price or large fall in price leads to large increase in volume.

Large volume with rise in price indicates bull market and the large volume with fall in price indicates bear market.

If the volumes decline for five consecutive days, then it will continue for another four days and the same is true in increasing volume.

NOTES



Breadth of the Market Analysis:
The breadth of market is the term often used to study the advances and declines that have occurred in the stock market

3.3.5 Breadth of the Market Analysis

The breadth of market is the term often used to study the advances and declines that have occurred in the stock market. Advances mean the number of shares whose prices have increased from the previous day's trading. Declines indicate the number of shares whose prices have fallen from the previous day's trading. This is easy to plot and watch indicator because data are available in all business dailies.

The net difference between the number of stock advanced and declined during the same period is the breadth of the market. A cumulative index of net differences measures the market breadth.

Harvey A. Krow has computed advances and declines as a ratio. He divided the advances by the declines. Any number greater than 1.00 indicates advances are exceeding decline. Values below 0.99 indicate declines are more than the advances. Ten-day and 200-day moving average of the A/D ratios are also computed. A ratio of 0.75 signals short-term buying opportunity and there will be intermediate rally in the beginning of the bearish trend.

In the later stages of bear market, the ratio declines below 0.5.

Except in the first phase of bull market a rise above 1.25 indicates selling opportunities.



Short sales: Short sales refer to the selling of shares that are not owned.

3.3.6 Contrary Opinion Theory: Short Sales

Short selling is a technical indicator known as short interest. Short sales refer to the selling of shares that are not owned. The bears are the short sellers who sell now in the hope of purchasing at a lower price in the future to make profits. The short sellers have to cover up their positions. Short positions of scrips are published in the business newspapers. When the demand for a particular share increases, the outstanding short positions also increase and it indicates future rise of prices. These indications cannot be exactly correct, but they show the general situations.

Short sales of a particular month is selected and compared with the average daily volume of the preceding month. This ratio shows how many days of trading it would take to use up total short sales. If the ratio is less than 1, market is said to be weak or overbought and a decline can be expected. The value between 1 and 0.5 shows neutral condition of the market. Values above 1 indicate bullish trend and if it is above 2 the market is said to be oversold. At market tops, short selling is high and at market bottoms short selling is low.

3.3.7 Contrary Opinion Theory: Odd Lot Trading

There was a time when shares were traded in a lot of hundreds. The shares that were less than hundred were sold as an odd lot. You must be wondering how investors got an odd lot. When the company issued shares, if the bid was more than the application

called for, the shares were divided among the investors. Though an outdated concept today, one may often come across the concept of odd lot trading. The ratio of odd lot purchases to odd lot sales (purchase / sales) is the odd lot index. The increase in odd lot purchase results in an increase in the index. Relatively more selling leads to fall in the index. It is generally considered that the professional investor is more informed and stronger than the odd lotters. When the professional investors dominate the market, the stock market is technically strong. If the odd lotters dominate the market, the market is considered to be technically weak. The notion behind is that odd lot purchase is concentrated at the top of the market cycle and selling at the bottom. High odd lot purchase forecasts fall in the market price and low purchases/sales ratios are presumed to occur toward the end of bear market.

NOTES

Several studies have indicated that the odd lotters do not move into the market at the peak and move out at bottom. In October 1987, New York stock market crashed. During the weeks prior to the crash contrary to the odd lot theory, odd lotters were selling more shares than they bought when market prices increased. After the crash, odd lotters sensibly became big buyers when stock prices were near their lows. These rational trading patterns defy the opinion about odd lot theory.

3.3.8 Moving Average Analysis

Market indices do not rise or fall in straight line. The upward and downward movements are interrupted by counter moves. The underlying trend can be studied by smoothening of the data. To smooth the data moving average technique is used.



'moving': The word 'moving' means that the body of data moves ahead to include the recent observation.

The word 'moving' means that the body of data moves ahead to include the recent observation. If it is five day moving average, on the sixth day the body of data moves to include the sixth day observation eliminating the first day's observation. Likewise, it continues. In the moving average calculation, closing price of the stock is used.

The moving averages are used to study the movement of the market as well as the individual scrip price. The moving average indicates the underlying trend in the scrip. The period of average determines the period of the trend that is being identified. For identifying short-term trend, 10 day to 30 day moving averages are used. In the case of medium-term trend, 50 day to 125 day are adopted. A 200 day moving average is used to identify long-term trend.

Index and stock price moving average

Individual stock price is compared with the stock market indices. The moving average of the stock and the index are plotted in the same sheet and trends are compared. If NSE or BSE index is above stock's moving average line, the particular stock has bullish trend. The price may increase above the market average. If the Sensex or Nifty is below the stock's moving average, the bearish market can be expected for the particular stock.

If the moving average of the stock penetrates the stock market index from above, it generates sell signal. Unfavourable market condition prevails for the particular scrip. If the stock line pushes up through the market average, it is a buy signal.

NOTES

Stock price and stock prices' moving average

Buy and sell signals are provided by the moving averages. Moving averages are used along with the price of the scrip. The stock price may intersect the moving average at a particular point. Downward penetration of the rising average indicates the possibility of a further fall. Hence, sell signal is generated in Figure 3.8. Upward penetration of a falling average would indicate the possibility of the further rise and gives the buy signal. As the average indicates the underlying trend, its violation may signal trend reversal that is shown in Figure 3.9.

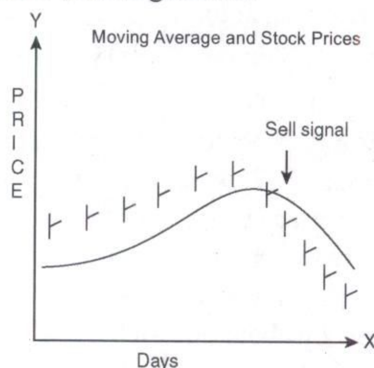


Fig. 3.8 The Sell Signal

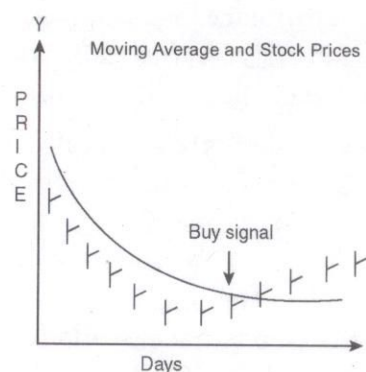


Fig. 3.9 Trend Reversal

Comparison of the two moving averages

When long-term and short-term moving averages are drawn, the intersection of two moving averages generates buy or sell signal. When the scrip price is falling and if the short-term average intersects the long-term moving average from above and falls below it, the sell signal is generated.

If the scrip price is rising, the short-term average would be above the long-term average. The short-term average intersects the long-term average from below indicating a further rise in price, gives a buy signal. The sell and buy signals are given in Figures 3.10 and 3.11.

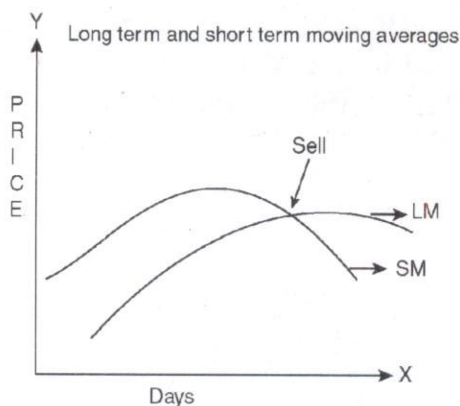


Fig. 3.10 The Buy Signal

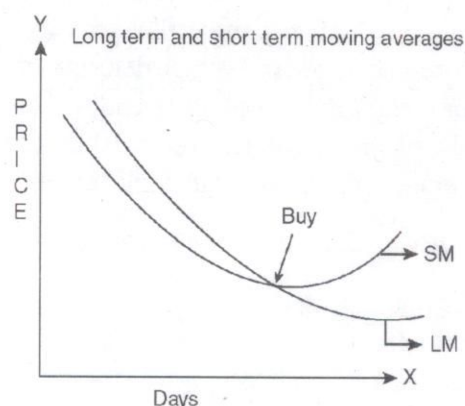


Fig. 3.11 The Sell Signal

But, if the short-term average moves above the long-term average, and the long-term average is falling, investor should treat intersection with suspicion. The short-term movement may not hold long. Hence, the investor should wait for the long-term average to turn up before buying the scrip. Similarly, if the short-term average moves below the long-term average before the long-term average has flattened out or before it reverses its direction, the investor should wait for the fall in the long-term average for reversal of direction before moving out of the scrip.

3.3.9 Oscillators

Oscillators indicate the market momentum or scrip momentum. Oscillator shows the share price movement across a reference point from one extreme to another. The momentum indicates:

- Overbought and oversold conditions of the scrip or the market
- Signalling the possible trend reversal
- Rise or decline in the momentum

Generally, oscillators are analysed along with the price chart. Oscillators indicate trend reversals that have to be confirmed with the price movement of the scrip. Changes in the price should be correlated to changes in the momentum, and then only buy and sell signals can be generated. Actions have to be taken only when the price and momentum agree with each other. With the daily, weekly or monthly closing prices oscillators are built. For short-term trading, daily price oscillators are useful.

3.3.10 Strength Analysis

Relative Strength Index (RSI) was developed by Wells Wilder. It is an oscillator used to identify the inherent technical strength and weakness of a particular scrip or market. RSI can be calculated for a scrip by adopting the following formula:

$$RSI = 100 - \left(\frac{100}{1+₹}\right)$$

$$₹ = \frac{\text{Average Gain Per Day}}{\text{Average Loss Per Day}}$$

The RSI can be calculated for any number of days depending on the wish of the technical analyst and the time frame of trading adopted in a particular stock market. RSI is calculated for 5, 7, 9 and 14 days. If the time period taken for calculation is more, the possibility of getting wrong signals is reduced. Reactionary or sustained rise or fall in the price of the scrip is foretold by the RSI. Table 3.8 shows the calculation of day RSI for ACC.

Table 3.8 *Calculation of Day RSI for ACC*

Date	*Price*	*Gain*	*Loss*
Feb 4	300	—	—
6	304	4	—
7	319	15	—
8	317	—	2
11	319	2	—
12	333	14	—
13	331	—	2
14	332	1	—
18	348	16	—
19	346	—	2
		52/9 = 5.78	6/9 = 0.67

NOTES



Relative strength index: It is an oscillator used to identify the inherent technical strength and weakness of a particular scrip or market

NOTES

$$RSI = 100 - \left[\frac{100}{1 + 8.627}\right]$$

$$= 100 - 10.387$$

$$= 89.613$$

The broad rule is, if the RSI crosses seventy there may be downturn and it is time to sell. If the RSI falls below thirty it is time to pick up the scrip. Figure 3.12 shows the buy and sell signals of a RSI chart.

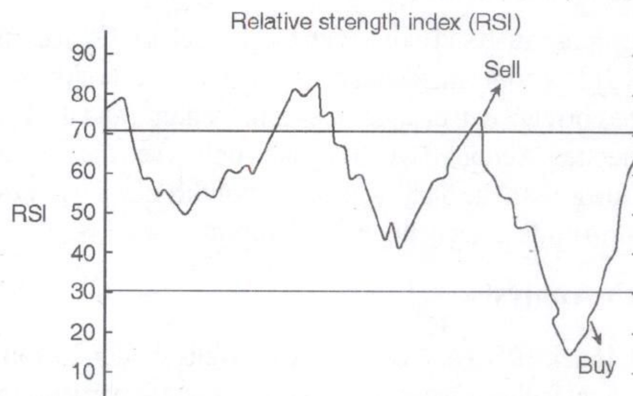


Fig. 3.12 The Buy and Sell Signals of a RSI Chart

If the share price is falling and RSI is rising, a divergence is said to have occurred. Divergence indicates the turning point of the market. If the RSI is rising in the overbought zone, it would indicate the downfall of the price. If RSI falls in the overbought zone, it gives a clear signal of 'sell'. The term 'overbought' describes the price level at which momentum can no longer be maintained and the price has to go down. This condition occurs after a sharp rise in price during a period of heavy buying. When the RSI is in the oversold region, it generates the buy signal. The term oversold is used to describe a security or market that has declined to an unreasonably low level. This condition is characterized by an increase in sales and excess of net declines.

3.3.11 Rate of Change



Rate of Change: Rate of change indicator (ROC) measures the rate of change between the current price and the price 'n' number of days in the past

Rate of change indicator (ROC) measures the rate of change between the current price and the price 'n' number of days in the past. ROC helps to find out the overbought and oversold positions in a scrip. It is also useful in identifying the trend reversal. Closing prices are used to calculate the ROC. Daily closing prices are used for the daily ROC and weekly closing prices for weekly ROC. Calculation of ROC for 12 weeks or 12 months is most popular.

Procedure

ROC can be calculated by two methods. In the first method, current closing price is expressed as a percentage of the twelve days or weeks in past. Suppose the price of AB company's share is ₹ 12 and price twelve days ago was ₹ 10 then the ROC is obtained by using the equation: $12/10 \times 100 = 120\%$. In the second method, the percentage variation between the current price and the price twelve days in the past is calculated. It is nothing but $12/10 \times 100 - 100 = 20\%$. By this method, both positive and negative values can be arrived.

NOTES

ROC graph

ROC can be plotted in a graph, x-axis representing days or months and y-axis the values of ROC. If the first method is adopted, ROC oscillates across the hundred lines. If the second method is used, the ROC oscillates around the zero line.

The main advantage of ROC is the identification of overbought and oversold region. The historic high and low values of the ROC should be identified at first to locate the overbought and oversold region. If the scrip's ROC reaches the historic high values, the scrip is in the overbought region and a fall in the value can be anticipated. Likewise, if the scrip's ROC reaches the historic low value, the scrip is in the oversold region, a rise in the scrip's price can be anticipated. Investor can sell the scrip in the overbought region and buy it in the oversold region. Figure 3.13 shows the overbought and the oversold region.

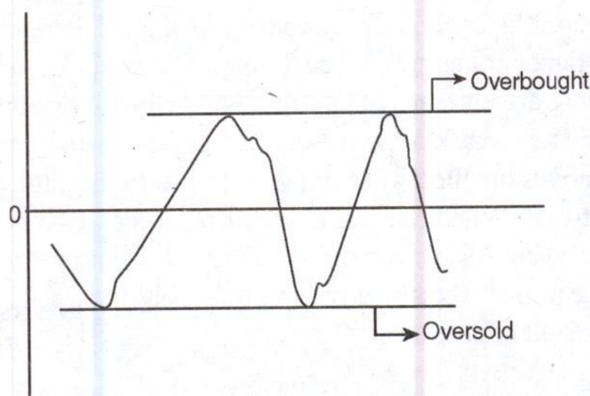


Fig. 3.13 The Overbought and the Oversold Region

3.3.12 Charts

Charts are the most valuable tools in technical analysis. The graphic presentation of data helps an investor to find out the trend of price without any difficulty. The charts also have the following uses:

- Spot the current trend for buying and selling
- Indicate the probable future action of the market by projection
- Show the past historic movement
- Indicate the important areas of support and resistance

The charts do not lie but interpretation differs from analyst to analyst according to their skills and experiences.

Point and figure charts

Technical analyst to predict the extent and direction of the price movement of a particular stock or the stock market indices uses point and figure (P and F) charts. These P and F charts are one-dimensional and there is no indication of time or volume. The price changes in relation to previous prices are shown. The change of price direction can be interpreted. The charts are drawn in the ruled paper. Figure 3.14 shows the P and F chart.

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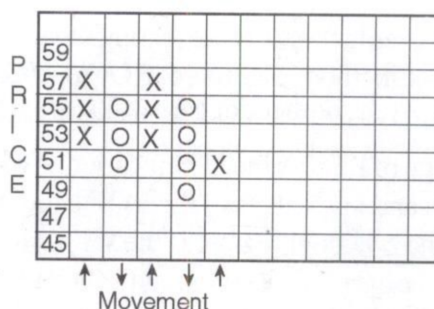


Fig. 3.14 The P and F Chart

The prices are given in the left of the figure as shown. The numbers represent the price of the stock at two-point interval. The interval of price changes can be 1,2,3,5 or 10 points. It depends on the analyst's preference. Further, it depends upon the stock price movement. Higher points are chosen for high priced stocks and vice-versa. Only whole number prices are entered. In Figure 3.15, the initial price 53 was entered in column 1 as X. The next mark X will be made only if the stock moves up to 55. As long as the price moves up, the Xs are drawn in the vertical column. Here, the stock price has moved to 57. When the stock price declines by two points or more the chartist records the change by placing the 'o' in the next column. Then the movements are interpreted. The trend reversals can be spotted easily. Figure 3.15 shows the trend reversals in the point and figure chart.

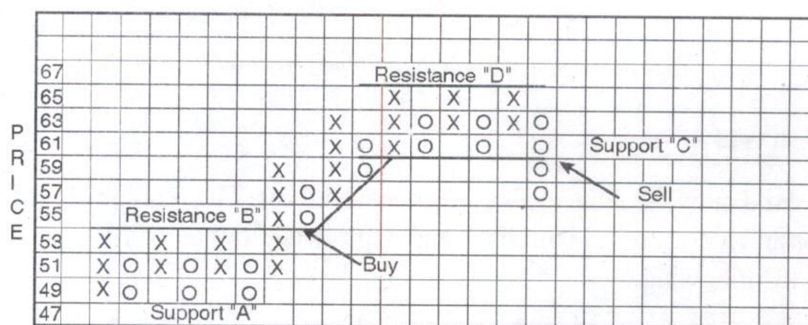


Fig. 3.15 The Trend Reversals in the P and F Chart

As long as the price moves between points A and B, there is little indication of price rise. As the price penetrates the resistance level, it generates a buy signal. The market may turn out to be bullish. Likewise, when the price pierces down the support level C indicates that the stock should be sold and the market may turn out to be bearish.

In spite of the simplicity in drawing the P and F charts, they have some inherent disadvantages also, which are as follows:

1. They do not show the intra-day price movement.
2. Whole numbers are only taken into consideration. This may result in the loss of information regarding the minor fluctuations.
3. Volume is not mentioned in the chart. Volume and trends of transactions are an important guide to make investment decision. In a bull market, price rise is accompanied by high volume of trading. The bear market is related to low volume of trading.

Bar charts

The bar chart is the simplest and most commonly used tool of a technical analyst. To build a bar a dot is entered to represent the highest price at which the stock is traded on that day, week or month. Then another dot is entered to indicate the lowest price on that particular date. A line is drawn to connect both the points a horizontal nub is drawn to mark the closing price. Line charts are used to indicate the price movements. The line chart is a simplification of the bar chart. In a line chart, a line is drawn to connect the successive closing prices.

NOTES



Bar charts: The bar chart is the simplest and most commonly used tool of a technical analyst

3.3.13 Chart Patterns

Charts reveal certain patterns that are of predictive value. Chart patterns are used as a supplement to other information and confirmation of signals provided by trend lines. Some of the most widely used and easily recognizable chart patterns are discussed here.

V formation

The name itself indicates that in the 'V' formation there is a long sharp decline and a fast reversal. The 'V' pattern occurs mostly in popular stocks where the market interest changes quickly from hope to fear and vice-versa. In the case of inverted '^' the rise occurs first and declines. There are extended 'V's. In it, the bottom or top moves more slowly over a broader area. The same has been explained through Figure 3.16 (a) and (b).

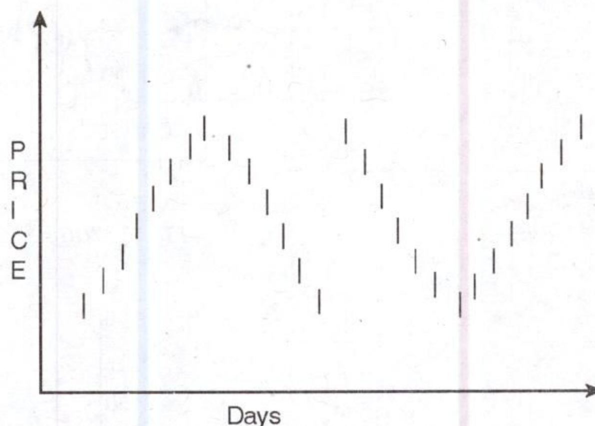


Fig. 3.16 (a) V-Shaped Reversal

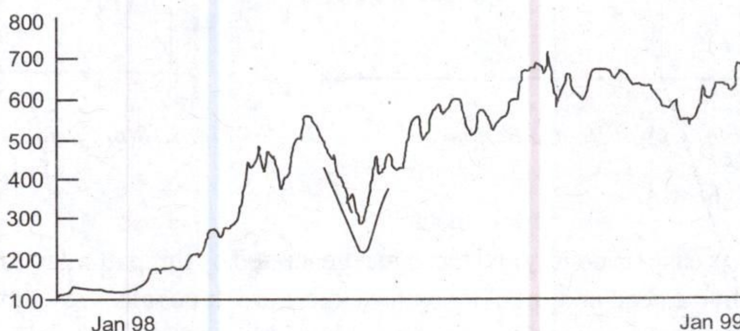


Fig. 3.16 (b) Zee Telefilms

NOTES

Tops and bottoms

Top and bottom formation is interesting to watch, but what is more important is the middle portion of it. The investor has to buy after up trend has started and exit before the top is reached. Generally, tops and bottoms are formed at the beginning or end of the new trends. The reversal from the tops and bottoms indicate sell and buy signals.

Double top and bottom

This type of formation signals the end of one trend and the beginning of another. If the double top is formed when a stock price rises to a certain level, falls rapidly, again rises to the same height or more, and turns down. Its pattern resembles the letter 'M'. The double top may indicate the onset of the bear market. But the results should be confirmed with volume and trend.

In a double bottom, the price of the stock falls to a certain level and increases with diminishing activity. Then it falls again to the same or to a lower price and turns up to a higher level. The double bottom resembles the letter 'W'. Technical analysts view double bottom as a sign for bull market. The double topper and bottom figures [Figures 3.17(a) and (b) and 3.18(a) and (b)] are given below with illustrations.

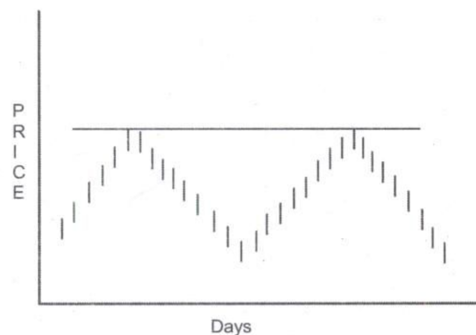


Fig. 3.17(a) Double Top

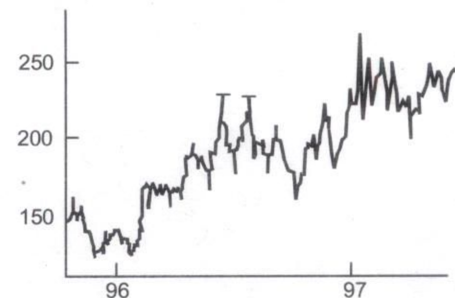


Fig. 3.17(b) BSES Ltd.

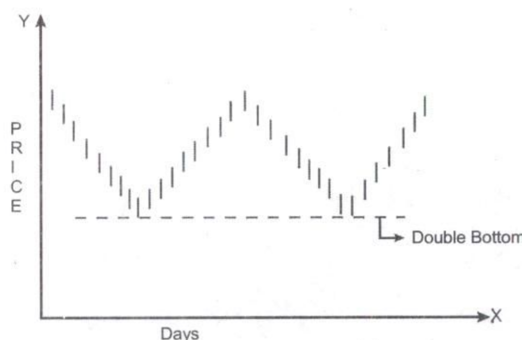


Fig. 3.18(a) Double Bottom

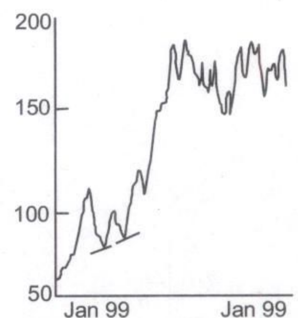


Fig. 3.18(b) Punjab Anand Lamp

Head and shoulders

This pattern is easy to identify and the signal generated by this pattern is considered to be reliable. In the head and shoulder pattern, there are three rallies resembling the left shoulder, a head and a right shoulder. A neckline is drawn connecting the lows of the tops. When the stock price cuts the neckline from above, it signals the bear market.

NOTES

The upward movement of the price for some duration creates the left shoulder. At the top of the left shoulder people who bought during the up trend begin to sell resulting in a dip. Near the bottom there would be reaction and people who have not bought in the first up trend start buying at relatively low prices thus pushing the price upward. The alternating forces of demand and supply create new ups and lows. [Figures 3.19(a) and (b) and 3.20(a) and (b)] explain the head and shoulders pattern.

Inverted head and shoulders

Here, the reverse of the previous pattern holds true. The price of stock's falls and rises that makes A inverted right shoulder. As the process of fall and rise in price continues the head and left shoulders are created. Connecting the tops of the inverted head and shoulders gives the neckline. When the price pierces the neckline from below, it indicates the end of bear market and the beginning of the bull market. These patterns have to be confirmed with the volume and trend of the market.

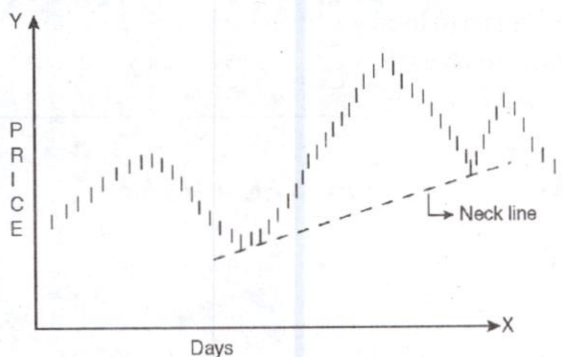


Fig. 3.19(a) Head and Shoulders

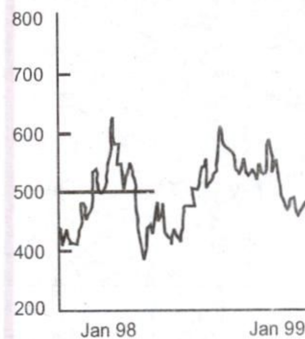


Fig. 3.19(b) TVS Suzuki

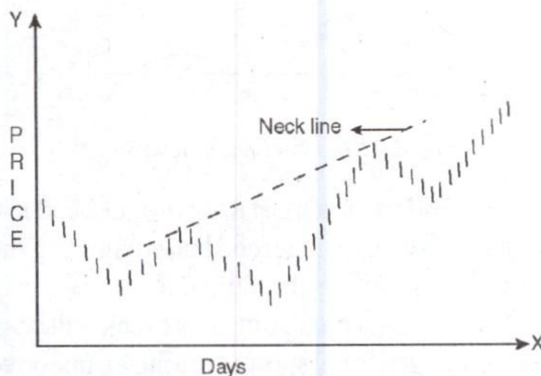


Fig. 3.20(a) Inverted Head and Shoulders

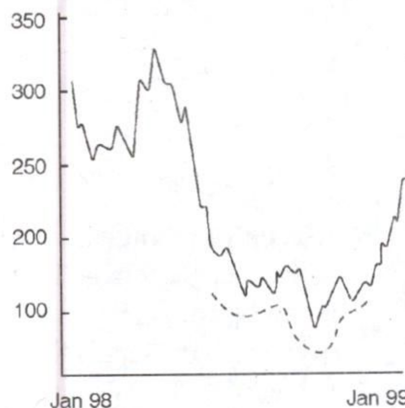


Fig. 3.20(b) Telco

Triangles

The triangle formation is easy to identify and popular in technical analysis. The triangles are of symmetrical, ascending, descending and inverted.

- **Symmetrical triangle:** This pattern is made up of series of fluctuations, each fluctuation smaller than the previous one. Tops do not attain the height of the previous tops. Likewise, bottoms are higher than the previous bottoms.



Symmetrical triangle: This pattern is made up of series of fluctuations, each fluctuation smaller than the previous one.

NOTES

Connecting the lower tops, which are slanting downward, forms a symmetrical triangle [Figure 3.21(a) and (b)]. Connecting the rising bottom, which is slanting upward, becomes the lower trend line. It is not easy to predict the break away either way. The symmetrical triangle does not have any bias towards the bull and bear operators. It indicates the slow down or temporary halt in the direction of the original trend. A probability of the original trend to continue after the completion of the triangle is always there.

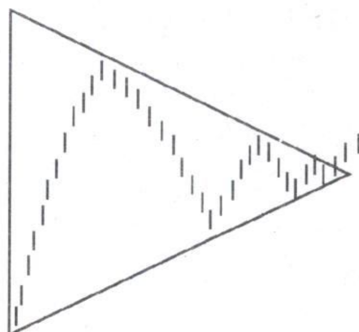


Fig. 3.21(a) Symmetrical Triangle

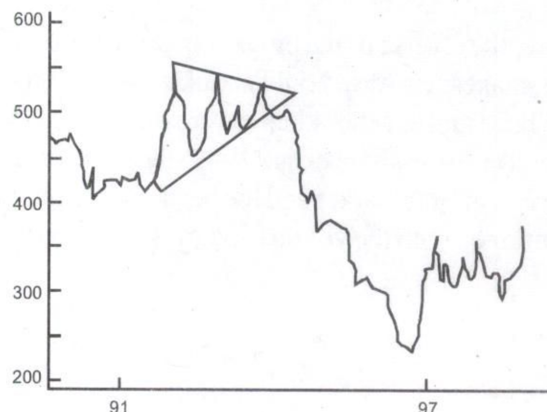


Fig. 3.21(b) Indian Rayon

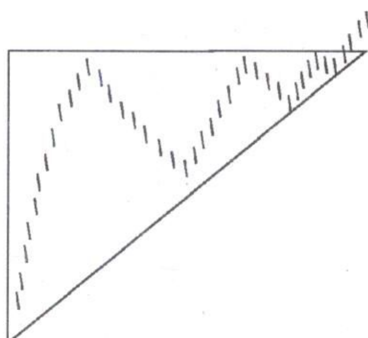


Fig. 3.22(a) Ascending Triangle

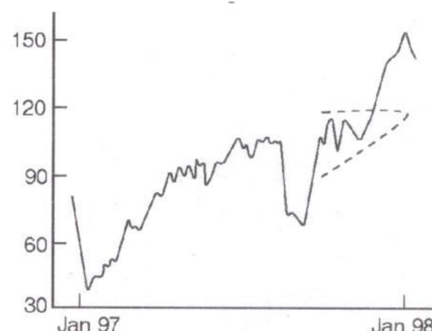


Fig. 3.22(b) Steelage Industries

- **Ascending triangle:** Here, the upper trend line is almost a horizontal trend line connecting the tops and the lower trend line is a rising trend line connecting the rising bottoms [Figure 3.22(a) and (b)]. When the demand for the scrip overcomes the supply for it, then there will be a break out. The break will be in favour of the bullish trend. This pattern is generally spotted during an up move and the probability of the upward move is high here.
- **Descending triangle:** Here, connecting the lower tops forms the upper trend line. The upper trend line would be a falling one. The lower trend line would be almost horizontal connecting the bottoms. The lower line indicates the support level. The possibility for a downward breakout is high in this pattern. The pattern indicates that the bear operators are more powerful than the bull operators. This pattern is seen during the downtrend. See Figure 3.23(a) and (b).

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Fig. 3.23(a) Descending Triangle

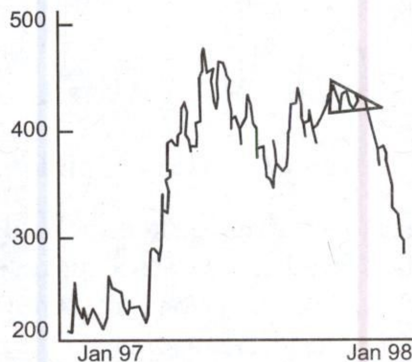


Fig. 3.23(b) Tata Tea

Flags

Flag pattern is commonly seen on the price charts. These patterns emerge either before a fall or rise in the value of the scrips. These patterns show the market corrections of the overbought or oversold situations. The time taken to form these patterns is quick. Each rally and setback may last only three to four days. If the pattern is wider it may take three weeks to complete the pattern. See Figures 3.24(a) and (b).

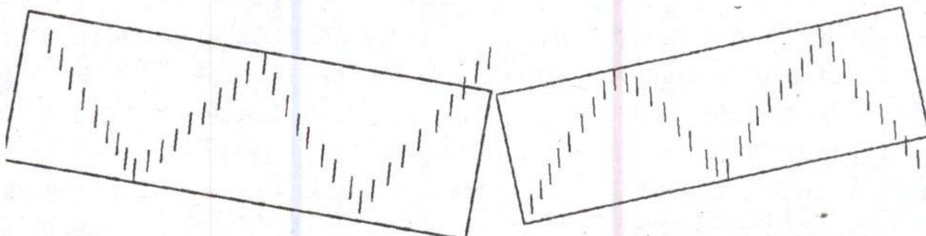


Fig. 3.24(a) Up Flag

Fig. 3.24(b) Down Flag

A flag resembles a parallelogram. A bullish flag is formed by two trend lines that stoop downwards. The breakout would occur on the upper side of the trend line. In a bearish flag, both the trend lines would be stooping upwards. The breakout occurs in the downward trend line.

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Pennant

Pennant looks like a symmetrical triangle. Here also there are bullish and bearish pennants. In the bullish pennant, the lower tops form the upper trend line. The lower trend line connects the rising bottoms. The bullish trend occurs when the value of scrip moves above the upward trend line. Likewise, in the bearish pennant, upward trend line is falling and the lower trend line is rising. See Figure 5.24(a) and (b).



Fig. 3.25(a) Up Pennant

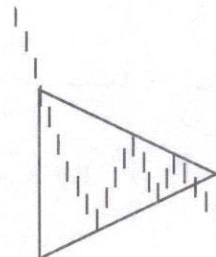


Fig. 3.25(b) Down Pennant

3.3.14 Confidence Index and Contrary Opinion

A confidence index is computed by using data from the bond market. The presumption is that actions of bond traders reveal trends that will emerge soon on the stock market. The confidence index is the ratio of the average yield on 10 top-rated bonds divided by the average yield on 10 intermediate-grade bonds. The ratio will always be below 100% because higher rated bonds will offer lower promised yields to maturity. When bond traders are optimistic about the economy, however, they might require smaller default premiums on lower rated debt. Hence, the yield spread will be narrow, and the confidence index will approach 100%. Therefore, higher values of the confidence index are bullish signals, and vice versa.

Contrary opinion

The theory of contrary opinion predicts price reversals following extremes in market sentiment. This research tests a survey-based sentiment index's usefulness as a contrary indicator across 28 U.S. futures markets. Using rigorous time-series tests, the sentiment index displays only a sporadic and marginal ability to predict returns, and in those instances the pattern is one of return continuation—not reversals. Therefore, futures traders who rely solely upon sentiment indices as contrary indicators may be misguided. Market sentiment can be an invaluable tool when it comes to picking market turning points. When sentiment readings reach an extreme it gives you an alert to a possible turn in the market. It signals an imbalance in the market; if 90% of traders are bullish at the end of the day, who is left to buy?

Contrary opinion in the trading business is defined as going (trading) against the popular or most widely held opinions in the marketplace. This notion of "going against the grain" of popular market opinion is difficult to undertake, especially when there is a steady drumbeat of fundamental information that seems to corroborate the popular opinion.

3.3.15 Technical Analysis vs Fundamental Analysis

The basic differences between the technical analysis and fundamental analysis are as follows:

1. Fundamental analysts analyses the stock based on the specific goals of the investors. They study the financial strength of corporate, growth of sales, earnings and profitability. They also take into account the general industry and economic conditions.

   The technical analysts mainly focus the attention on the past history of prices. Generally, technical analysts choose to study two basic market data-price and volume.

2. The fundamental analysts estimate the intrinsic value of the shares and purchase them when they are undervalued. They dispose the shares when they are over priced and earn profits. They try to find out the long-term value of shares.

   Compared to fundamental analysts, technical analysts mainly predict the short-term price movement rather than long-term movement. They are not committed to buy and hold policy.

3. Fundamentalists are of the opinion that supply and demand for stocks depend on the underlying factors. The forecasts of supply and demand depend on various factors.

Technicians opine that they can forecast supply and demand by studying the prices and volume of trading.

In both the approaches, supply and demand factors are considered to be critical. Business, economic, social and political concerns affect the supply and demand for securities. These underlying factors in the form of supply and demand come together in the securities' market to determine security prices.

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3.4 SUMMARY

Some of the important concepts discussed in this unit are:

- Fundamental analysis is the study of economic factors, industrial environment and the factors related to the company.
- The state of the economy determines the growth of gross domestic product and investment opportunities.
- An economy with favourable savings, investments, stable prices, balance of payments and infrastructure facilities provides the best environment for common stock investment.
- The leading, coincidental and lagging indicators help to forecast the economic growth. A rising stock market indicates a strong economy ahead.
- Industrial growth follows a pattern. Buying of shares beyond the pioneering stage and selling of shares before the stagnation stage are ideal for the investors.

Check Your Progress

8. When is a market said to be bullish?
9. Who are the bears in the market?
10. Who developed the relative strength index (RSI)?
11. What are the uses of charts in technical analysis?

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- The cost structure, research and development and the government policies regarding the industries influence the growth and profitability of the industries. SWOT analysis reveals the real status of the industry.
- The competitive edge of the company could be measured with the company's market share, growth and stability of its annual sales.
- The financial statements of the company reveal the needed information for the investor to make investment decision.
- The financial health of the company could be analysed with the fund flow and cash flow statements.
- The ratio analysis helps the investor to study the individual parameters like profitability, liquidity, leverage and the value of the stock.
- Technical analysts study the behaviour of the price of the stock to determine the future price of the stock.
- According to Charles H. Dow, stock price movements are divided into three: the primary movement, the secondary movement and the daily fluctuations.
- A primary trend may be a bull market moving in a steady upward direction, or a bear market steadily dropping.
- A secondary trend or secondary reaction is the movement of the market contrary to the primary trend.
- Support level is the barrier for further decline. It provides a base for an up move. The resistance level is the level in which advances are temporarily stopped and the sellers overcome the demand.
- Volume of the trade confirms the trend. Fall of volume with the rise in price indicates trend reversal and vice-versa.
- Breadth of the market is the net number of stocks advancing versus those declining in the market. If the A/D line slopes downward while the Sensex is rising, it gives a bearish signal and vice-versa.
- Moving averages are used as a technical indicator. They smoothen out the short term fluctuations, help in comparing the stock price movement with the index movement and discover the trend.
- Oscillators show the market or scrip momentum to find out the overbought and oversold conditions of the market or scrip. Relative strength index and rate of change index are the commonly used oscillators.
- Charts are major analytical tools used in technical analysis. Point and figure chart is a one-dimensional chart drawn to predict the extent and direction of the price movement. Ordinary bar charts generate numerous patterns. These patterns indicate the trend and trend reversals.

3.5 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The demographic data provides details about the population by age, occupation, literacy and geographic location. This is needed to forecast the demand for the consumer goods. The population by age indicates the availability of able work force.

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2. The indicators are selected on the basis of the following criteria:
    - Economic significance
    - Statistical adequacy
    - Timing
    - Conformity
3. The growth industries have special features of high rate of earnings and growth in expansion, independent of the business cycle. The expansion of the industry mainly depends on the technological change.
4. The life cycle of the industry is separated into four well-defined stages such as:
    (i) Pioneering stage
    (ii) Rapid growth stage
    (iii) Maturity and stabilization stage
    (iv) Declining stage
5. The market share of the annual sales helps to determine a company's relative competitive position within the industry. If the market share is high, the company would be able to meet the competition successfully.
6. Financial ratios are calculated from the balance sheet and profit and loss account. The relationship can be either expressed as a percent or as a quotient.
7. Earnings per share are the earnings after tax divided by the number of common shares outstanding.
8. A market is said to be bullish when small volume of trade and large volume of trade follow the fall in price and the rise in price.
9. The bears are the short sellers who sell now in the hope of purchasing at a lower price in the future to make profits. The short sellers have to cover up their positions.
10. Relative strength index (RSI) was developed by Wells Wilder.
11. Charts have the following uses:
    - They spot the current trend for buying and selling.
    - They indicate the probable future action of the market by projection.
    - They show the past historic movement.
    - They indicate the important areas of support and resistance.

3.6 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is meant by economic forecasting?
2. Why is long-term debt said to be a good source of finance?
3. How is the competitiveness of the company studied?
4. How can the knowledge of market share help?

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5. Write a note on price earnings ratio.
6. Which are the main statements used in financial analysis?
7. State the limitations of financial analysis.
8. What are the assumptions with regard to technical analysis?
9. What do you know about technical indicators?

Long-Answer Questions

1. How will you analyse GDP and savings and investment while carrying out economic analysis?
2. What are the stages of the industry life cycle? What happens in the declining stage?
3. Describe the Dow theory of technical analysis.
4. Differentiate between support and resistance levels with the help of suitable figures and illustrations.
5. Explain the features of technical indicators.
6. 'Oscillators are valuable tools in assessing overbought and oversold position of the market'. Discuss.
7. 'Chart patterns are helpful in predicting the stock price movement'. Comment.

UNIT 4 PORTFOLIO CONSTRUCTION AND CHOICE

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Structure

4.0 INTRODUCTION

In this unit, you will learn about portfolio construction and choice. Harry Markowitz opened new vistas to modern portfolio selection in an article in the 'Journal of Finance' in March 1952. His article indicated the importance of correlation among the returns of different stocks in the construction of a stock portfolio. Markowitz also showed that for a given level of expected return in a group of securities one security would dominate the others. To find such security, the knowledge of the correlation coefficients between all possible securities combinations is required. After the publication of his paper, numerous investment firms and portfolio managers developed 'Markowitz algorithms' to minimize portfolio variance, i.e., risk. Even today the term 'Markowitz diversification' is used to refer to the portfolio construction accomplished with the help of security covariances. In this unit, you will study about the Markowitz model.

The investor always likes to purchase a combination of stocks that provides the highest return and has the lowest risk. He wants to maintain a satisfactory reward- to-risk ratio. Traditionally, analysts paid more attention to the return aspect of the stocks. Nowadays, risk in receiving increased attention and analysts are providing estimates of risk as well as return. The investors are interested to calculate expected return, risk and covariance for every security included in the portfolio. This involves the use of factor models that will be discussed in detail in this unit.

The Markowitz model is adequate and conceptually sound in analysing the risk and return of the portfolio. The problem with the Markowitz model is that a number of covariances have to be estimated. If a financial institution buys 150 stocks, it has to estimate 11,175 i.e. $(N^2 – N)/2$ correlation co-efficients. Sharpe has developed a simplified model to analyse the portfolio. He assumed that the return of a security is

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linearly related to a single index like the market index. Strictly speaking, the market index should consist of all the securities trading on the exchange. In the absence of it, a popular index can be treated as a representative of general market. For example, even though BSE-Sensex, BSE-100, and NSE-50 do not use all the scrips' prices to construct their indices, they can be used as surrogates. This would dispense the need for calculating hundreds of covariances. Any movement in security prices could be understood with the help of the index movement.

4.1 UNIT OBJECTIVES

After going through this unit, you should be able to:

- Understand the concepts of Markowitz diversification of portfolio
- Develop an idea about portfolio choice
- Analyse Sharpe's single and two-factorial models
- Interpret the Lagrange multiplier method
- Learn the technique of calculating the minimum variance portfolio

4.2 MARKOWITZ DIVERSIFICATION



Portfolio: Portfolio means the group of assets an investor owns

Portfolio risk can be reduced by the simplest kind of diversification. **Portfolio** means the group of assets an investor owns. The assets may vary from stocks to different types of bonds. Sometimes the portfolio may consist of securities of different industries. When different assets are added to the portfolio, the total risk tends to decrease. In the case of common stocks, diversification reduces the unsystematic risk or unique risk. Analysts opine that if 15 stocks are added in a portfolio of the investor, the unsystematic risk can be reduced to zero. But at the same time if the number exceeds 15, you cannot reduce risk further. But diversification cannot reduce systematic or undiversifiable risk.

The naive kind of diversification is known as simple diversification. In the case of simple diversification, securities are selected at random and no analytical procedure is used.

Total risk of the portfolio consists of systematic and unsystematic risk and this total risk is measured by the variance of the rates of returns over time. Many studies have shown that the systematic risk forms one-quarter of the total risk.

Simple random diversification reduces the total risk. The reason behind this is that the unsystematic price fluctuations are not correlated with the market's systematic fluctuations. Figure 4.1 shows how simple diversification reduces the risk. The standard deviations of the portfolios are given in Y axis and the number of randomly selected portfolio securities in the X axis.

The standard deviation was calculated for each portfolio and plotted. As the portfolio size increases, the total risk line starts declining. It flattens out after a certain

point. Beyond that limit, risk cannot be reduced. This indicates that spreading out the assets beyond certain level cannot be expected to reduce the portfolio's total risk below the level of undiversifiable risk.

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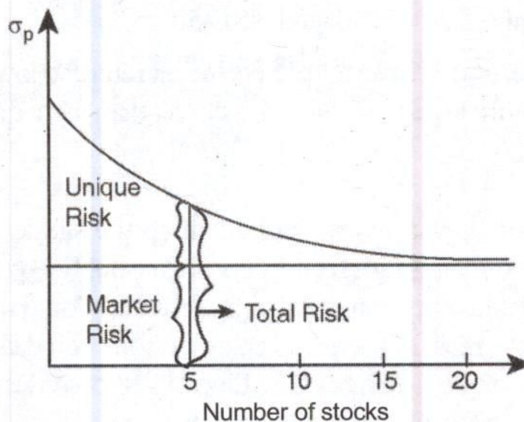


Fig. 4.1 Diversification and Portfolio Risk

Problems of vast diversification: Spreading the investment on too many assets will give rise to problems such as purchase of poor performers, information inadequacy, high research cost and transaction cost.

Purchase of poor performers: While buying numerous stocks, sometimes the investor may also buy stocks that will not yield adequate return.

Information inadequacy: If there are too many securities in a portfolio, it is difficult for the portfolio manager to get information about their individual performance. The portfolio manager has to be in touch with the details regarding the individual company performance. To get all the information simultaneously is quite difficult.

High research cost: If a large number of stocks are included, before the inclusion itself the returns and risk of the individual stock have to be analysed. Towards this end, lot of information has to be gathered and kept in store and these procedures involve high cost.

High transaction cost: When small quantities of stocks are purchased frequently, the investor has to incur higher transaction cost than the purchase of large blocks at less frequent intervals. In spite of all these difficulties big financial institutions purchase hundreds of different stocks. Likewise, mutual funds also invest in different stocks.

4.2.1 The Markowitz Model

Most people agree that holding two stocks is less risky than holding one stock. For **example**, holding stocks from textile, banking, and electronic companies is better than investing all the money on the textile company's stock. But building up the optimal portfolio is very difficult. Markowitz provides an answer to it with the help of risk and return relationship.

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Assumptions

The individual investor estimates risk on the basis of variability of returns, i.e., the variance of returns. Investor's decision is solely based on the expected return and variance of returns only.

For a given level of risk, investor prefers higher return to lower return. Likewise, for a given level of return investor prefers lower risk than higher risk.

Concept

In developing his model, Markowitz had given up the single stock portfolio and introduced diversification. The single security portfolio would be preferable if the investor is perfectly certain that his expectation of highest return would turn out to be real. In the world of uncertainty, most of the risk-averse investors would like to join Markowitz rather than keeping a single stock, because diversification reduces the risk. This can be shown with the help of the following illustration.

Take the stock of ABC company and XYZ company. The returns expected from each company and their probabilities of occurrence, expected returns and the variances are given. The calculation procedure is given in the Table 4.1.

Table 4.1 *Taking Stock of Two Companies*

	Stock ABC	Stock XYZ
Return %	11 or 17	20 or 8
Probability	.5 each return	.5 each return
Expected Return	14	14
Variance	9	36
Standard deviation	3	6

ABC Expected return = $.5 \times 11 + .5 \times 17 = 14$

XYZ Expected return = $.5 \times 20 + .5 \times 8 = 14$

ABC variance = $.5\,(11-14)^2 + .5\,(17-14)^2 = 9$

XYZ variance = $.5\,(20-14)^2 + .5\,(8-14)^2 = 36$

ABC standard deviation = $\sqrt{\text{Variance}} = \sqrt{9} = 3$

XYZ standard deviation = $\sqrt{\text{Variance}} = \sqrt{36} = 6$

The stocks of ABC and XYZ companies have the same expected return of 9 per cent. XYZ company's stock is much riskier than ABC stock, because the standard deviation of the former being 6 and latter 3. When ABC return is high, XYZ return is low and vice-versa, i.e., when there is 17 per cent return from ABC, there would be 8 per cent return from XYZ. Likewise, when ABC return is 11 per cent, XYZ return is 20 per cent. If a particular investor holds only ABC or XYZ, he would stand to lose in the time of bad performance.

Suppose the investor holds two-thirds of ABC and one-third of XYZ, the return can be calculated as follows:

$$R_p = \sum_{t=1}^{N} X_1 R_1$$

R_p = return on the portfolio

X_1 = proportion of total portfolio invested in security 1.

R_1 = expected return of security 1.

Let us calculate the expected return for both the possibilities.

Possibility 1 = 2/3 × 11 + 1/3 × 20 = 14

Possibility 2 = 2/3 × 17 + 1/3 × 8 = 14

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In both the situations, the investor stands to gain if the worst occurs, than by holding either of the security individually.

Holding two securities may reduce the portfolio risk too. The portfolio risk can be calculated with the help of the following formula.

$$\sigma_p = \sqrt{X_1^2\,\sigma_1^2 + X_2^2\,\sigma_2^2 + 2X_1\,X_2\,(r_{12}\,\sigma_1\,\sigma_2)}$$

σ_p = portfolio standard deviation

X_1 = percentage of total portfolio value in stock X_1

X_2 = percentage of total portfolio value in stock X_2

σ_1 = standard deviation of stock X_1

σ_2 = standard deviation of stock X_2

r_{12} = correlation coefficient of X_1 and X_2

$$r_{12} = \frac{\text{covariance of } X_{12}}{\sigma_1\,\sigma_2}$$

Using the same example given in the return analysis, the portfolio risk can be estimated. Let us assume ABC as X_1 and XYZ as X_2. Now the covariance is: X_{12}

$$\text{Covaviance of } X_{12} = \frac{1}{N}\sum_{i=1}^{N}(R_1-\bar{R}_1)(R_2-\bar{R}_2)$$

$$= \frac{1}{2}[(11-14)(20-14)+(17-14)(18-14)]$$

$$= \frac{1}{2}[(-18)+(-18)] = \frac{-36}{2} = -18$$

$$r = \frac{\text{covariance of } X_{12}}{\sigma_1\sigma_2} = \frac{-18}{3\times 6} = -1$$

The correlation coefficient indicates the similarity or dissimilarity in the behaviour of X_1 and X_2 stocks. In correlation, covariance is not taken as an absolute value but relative to the standard deviation of individual securities. It shows how much X and Y vary together as a proportion of their combined individual variations measured by σ_1 and σ_2. In our example, the correlation coefficient is –1.0 which indicates that there is a perfect negative correlation and the returns move in the opposite direction. If the correlation is 1, perfect positive correlation exists between the securities and they tend to move in the same direction. If the correlation coefficient is zero, the securities' returns are independent. Thus, the correlation between two securities depends upon the covariance between the two securities and the standard deviation of each security.

Now, let us proceed to calculate the portfolio risk. Combination of two securities reduces the risk factor if less degree of positive correlation exists between them. In our case, the correlation coefficient is –1.

Note: Some authors use "w" instead of "x" to refer the proportion or weight of individual investments in the portfolio.

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$$\sigma_p = \sqrt{X_1^2\,\sigma_1^2 + X_2^2\,\sigma_2^2 + 2X_1\,X_2\,(r_{12}\,\sigma_1\,\sigma_2)}$$

$$= \sqrt{(2/3)^2 \times 9 + (1/3)^2 \times 36 + 2 \times 2/3 \times 1/3\,(-1 \times 3 \times 6)}$$

$$= \sqrt{4 + 4 + (-8)}$$

$$= \sqrt{0}$$

The portfolio risk is nil if the securities are related negatively. This indicates that the risk can be eliminated if the securities are perfectly negatively correlated. The standard deviation of the portfolio is sensitive to (1) the proportions of funds devoted to each stock, (2) the standard deviation of each security and (3) covariance between two stocks.

The change in portfolio proportions can change the portfolio risk. Taking the same example of ABC and XYZ stock, the portfolio standard deviation is calculated for different proportions.

Stock ABC (X_1)	Stock XYZ (X_2)	Portfolio Standard Deviation
100	0	3
66.66	33.3	0
50.0	50.0	1.5
0	100	6

By skillful balancing of the investment proportions in different securities, the portfolio risk can be brought down to zero. The proportion to be invested in each security can be found out by

$X_1 = \sigma_1 \div (\sigma_1 + \sigma_2)$ the precondition is that the correlation coefficient should be –1.0.

$X_2 = 1 - X_1$

Otherwise it is

$$X_1 = \frac{\sigma_2^2 - (r_{12}\,\sigma_1\sigma_2)}{\sigma_1^2 + \sigma_2^2 - (2r_{12}\,\sigma_1\sigma_2)}$$

If the correlation coefficient is less than the ratio of smaller standard deviation to larger standard deviation, then the combination of two securities provides a lesser standard deviation of return than when either of the security is taken alone. In our example,

$$-1 < \frac{3}{6} \text{ i.e. } -1 < +.50$$

If the standard deviation ratio is 4/6 and the correlation coefficient is + .8, the combination of securities is not profitable because

$$+.8 > \frac{4}{6} \text{ i.e. } +.8 > .66$$

Varying degrees of correlation

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Here in order to learn more about the relationship between securities, different degrees of correlation, coefficients are analysed. Extreme cases like +1, –1, intermediate values and no correlation are calculated for two securities namely X and Y. We assume that the investor has specific amount of money to invest and that can be allocated in any proportion between the securities. Security X has an expected rate of return of 5 per cent and a standard deviation of 4 per cent. While for security Y, the expected return is 8 per cent and the standard deviation of return is 10 per cent.

Let us first work out the expected return and the portfolio risk for different values of correlation coefficients for varying proportions of the securities X and Y. Portfolio return is calculated with the equation:

$$R_p = X_x R_x + X_y R_y$$

If there is 75 per cent investment on X and 25 per cent on Y, then R_p = .75 (5%) + 0.25 (8%) = 5.75% then the σ_p would be found out by using equation

$$\sigma_p = \sqrt{X_x^2 \sigma_x^2 + X_y^2 \sigma_y^2 + 2X_x X_y (r_{xy} \sigma_x \sigma_y)}$$

$$= \sqrt{3/4 \times 3/4 \times 16 + 1/4 \times 1/4 \times 100 + 2 \times 3/4 \times 1/4 (1 \times 4 \times 10)}$$

$$= 5.5$$

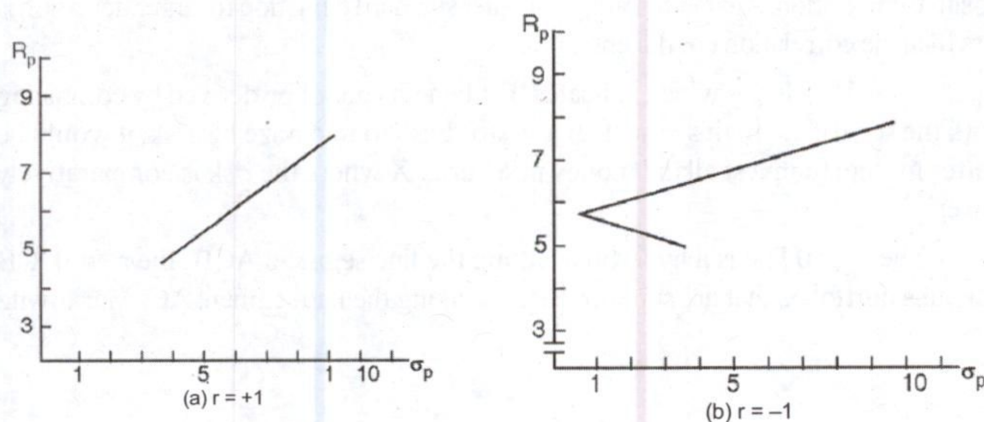
Table 4.2 gives the values of R_p and σ_p for varying degrees of correlation coefficients.

Table 4.2 *Values of R_p and σ_p for Different Correlation Coefficients*

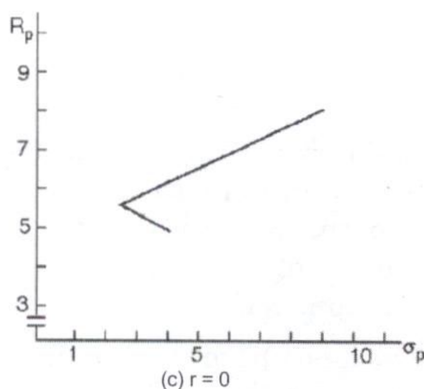
Proportion of X security in portfolio X	Proportion of Y security in portfolio 1– X	R_p r_{xy}	σ_p r_{xy} +1	σ_p r_{xy} –1	σ_p r_{xy} 0	σ_p +.5
1.00	0.00	5.00	4.0	4.0	4.0	4.0
0.75	0.25	5.75	5.5	0.5	3.9	4.8
0.50	0.50	6.50	7.0	3.0	5.4	6.25
0.25	0.75	7.25	8.5	6.5	7.6	8.1
0.00	1.00	8.00	10.0	10.0	10.0	10.0

Risk and return with different correlation

Figure 4.2 (a), (b), (c) and (d) indicate the relationship between risk and return.



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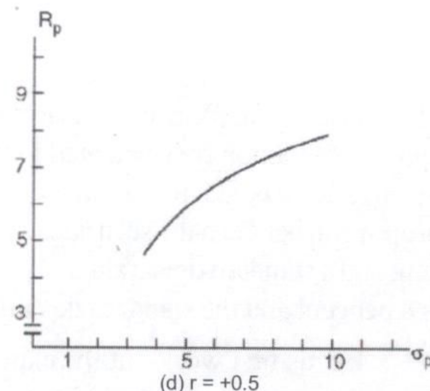


Fig. 4.2 (a–d) *Relationship between Risk and Return*

All the graphs show the portfolio risks under varying levels of correlation coefficients. All the figures can be assembled together and placed in a single figure. Figure 4.3 expresses the relationship between expected returns and standard deviations of returns for various correlation coefficients.

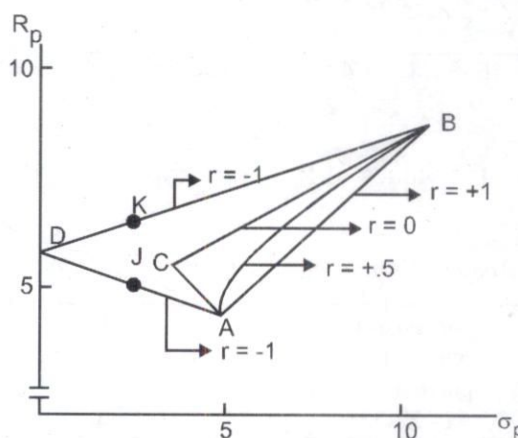


Fig. 4.3 *Two Security Portfolio with Different correlation Coefficients*

In Figure 4.3, portfolio return is given on the vertical axis and portfolio risk on the horizontal axis. Point A represents 100 per cent holdings of X and point B represents 100 per cent holdings of Y. The intermediate points along the line segment AB represent portfolios containing various combinations of two securities. The straight line r_x=+1 shows that the portfolio risk increases with the increase in portfolio return. Here, the combination of two securities could not reduce the portfolio risk because of their positive correlation. Again, the ratio of smaller standard deviation to larger deviation is less than the correlation coefficient.

1 > 4/10 = 1 >.4, which indicates that benefit cannot be derived by combining both the securities. In this case if an investor wish to minimize his risk, it would be better for him to invest all the money in security X where the risk is comparatively lower.

The r_{xy} = 0 line is a hyperbola. Along the line segment ACB, the r_{xy} = 0. CB contains portfolios that are superior to those along the line segment AC. Markowitz

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says that all portfolios along the ACB line segment are feasible but some are more efficient than others. The line segment ADB indicates (r_{xy} = –1) perfect inverse correlation and it is possible to reduce portfolio risk to zero. At D, the portfolio risk is zero. Portfolios on the line segment DB provides superior returns than on the line segment AD. For **example**, take two points on both the line segments K and J. The point K is superior to the point J because with the same level of risk the investor earns more return on point K than on point J.

Thus, Markowitz diversification can lower the risk if the securities in the portfolio have low correlation coefficients.

4.2.2 Efficient Frontier

The risk and return of all portfolios plotted in risk-return space would be dominated by efficient portfolios. A Portfolio is built using available securities. All the possible combination of expected return and risk compose the attainable set. Table 4.3 shows the expected return and risk of different portfolios.

Table 4.3 *Portfolio Risk and Return*

Portfolio	Expected Return (R_p) %	Risk (σ_p)
A	17	13
B	15	8
C	10	3
D	7	2
E	7	4
F	7	8
G	10	12
H	9	8
J	6	7.5

The attainable set of portfolios are illustrated in Figure 4.4. Each of the portfolio along the line or with in the line ABCDEFGJ is possible. It is not possible for the investor to have portfolio outside of this perimeter because no combination of expected return and risk exists there.

When the attainable sets are examined, some are more attractive than others. Portfolio B is more attractive than portfolios F and H because B offers more return on the same level of risk. Likewise, C is more attractive than portfolio G as even though same level of return is got in both the points; the risk level is lower at point C. In other words, any portfolio which gives more return for the same level of risk or same return with lower risk is more preferable than any other portfolio. Among all the portfolios, the portfolios which offer the highest return at particular level of risk are called efficient portfolios. Here the efficient portfolios are A, B, C and D, because at these points no other portfolio offer higher return. The ABCD line is the efficient frontier (Figure 4.4) along which all attainable and efficient portfolios are available. Similarly, I, D and A represent the inefficient frontier because the return is less for the same level of risk. Now the question raised is which portfolio the investor should choose? He would choose a portfolio that maximizes his utility. For that utility analysis has to be done.

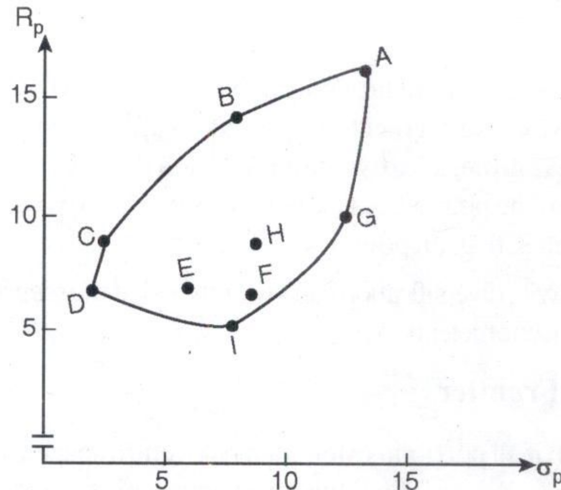


Fig. 4.4 Efficient Frontier

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Utility: Utility is the satisfaction the investor enjoys from the portfolio return

Utility analysis

Utility is the satisfaction the investor enjoys from the portfolio return. An ordinary investor is assumed to receive greater utility from higher return and vice versa. The investor gets more satisfaction or more utility in X + 1 rupees than from X rupee. If he is allowed to choose between two certain investments, he would always like to take the one with larger outcome. Thus, utility increases with increase in return.

The utility function makes certain assumptions about an investors' taste for risk. The investors are categorized into risk averse, risk neutral, and risk seeking investor. All the three types can be explained with the help of a fair gamble.

In a fair gamble which cost ₹ 1, the outcomes are A and B events. 'A' event will yield ₹ 2. Occurrence of B event is a dead loss, i.e., 0. The chances of occurrence of both the events are 50 per cent and 50 per cent. The expected value of investment is (1/2) 2 + 1/2 (0) = ₹ 1. The expected value of the gamble is exactly equal to cost. Hence, it is a fair gamble. The position of the investor may be improved or hurt by undertaking the gamble.

A risk averter rejects a fair gamble because the disutility of the loss is greater for him than the utility of an equivalent gain. A risk neutral investor means that he is indifferent to whether a fair gamble is undertaken or not. The risk seeking investor would select a fair gamble, i.e., he would choose to invest. The expected utility of investment is higher than the expected utility of not investing. These three different types of investors are shown in Figure 4.5.

The curves ABC are three different slopes of utility curves. The upward sloping curve A shows increasing marginal utility. The straight line B shows constant utility, and curve C shows diminishing marginal utility. The constant utility, a linear function means doubling of returns would double the utility and it indicates risk neutral situation. The increasing marginal utility suggests that the utility increases more than proportion to increase in return and shows the risk lover. The curve C shows risk-averse investor. The utility he gains from additional return declines gradually. Figures 4.6, 4.7, and 4.8 show the utility curves of the different investors.

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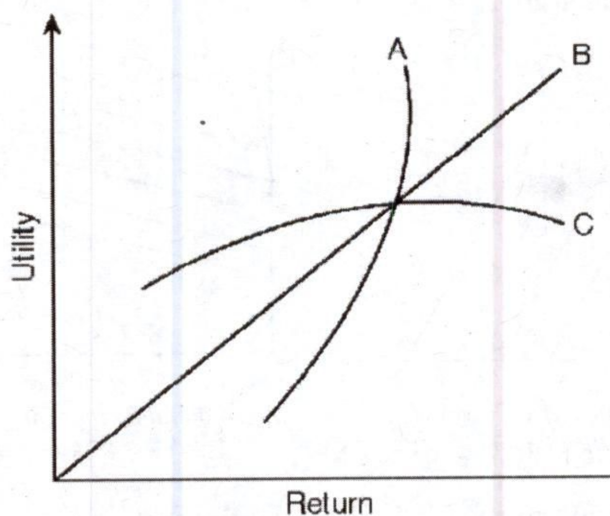


Fig. 4.5 Marginal Utility and Return

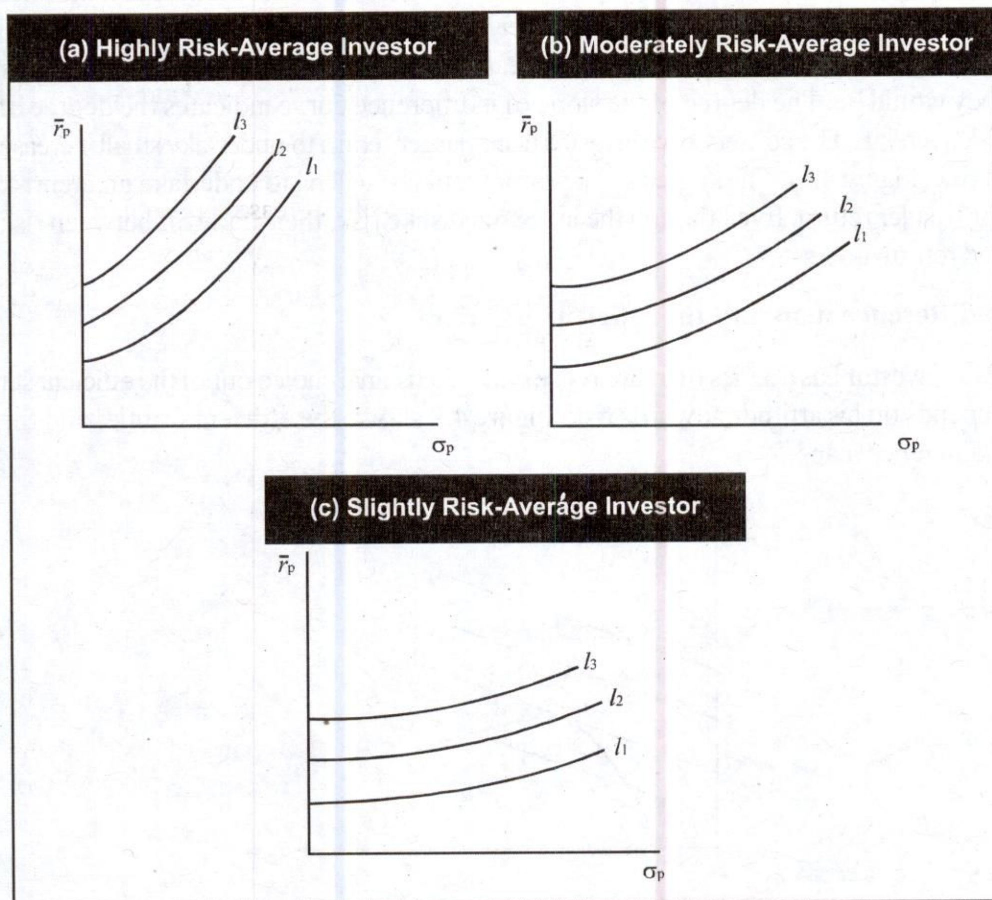


Fig. 4.6 High, Moderate and Slightly Risk Averse Indifference Curves

(Source: http://pages.cs.brandeis.edu/~magnus/stocks/node3.html)

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Accessed on 29 March 2012

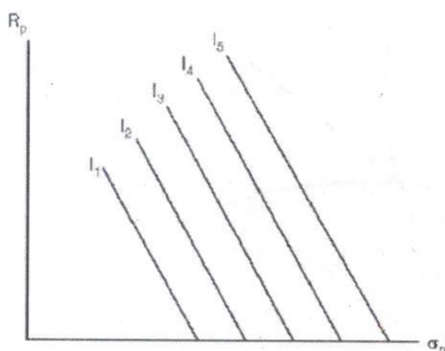


Fig. 4.7 Indifference Curves of the Risk Loving

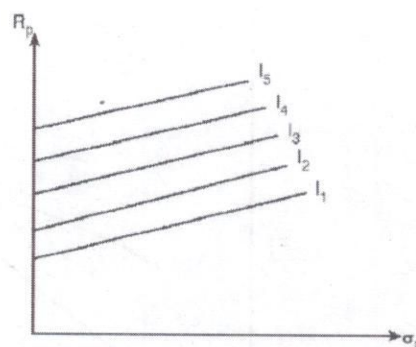


Fig. 4.8 Indifference Curves of the Less Risk Fearing

Marginal utility and return

Investors generally like to get more returns for additional risks assumed and the lines would be positively sloped. The risk lover's utility curves are negatively sloped and converge towards the origin. For the risk fearing, lower the risk of the portfolio, happier they would be. The degree of the slope of indifference curve indicates the degree of risk aversion. The conservative investor needs larger return to undertake small increase in risk (Figure 4.6). The aggressive investor would be willing to undertake greater risk for smaller return. Even though the investors dislike risk, their trade off between risk and return differs.

Indifference map and the efficient frontier

Each investor has a series of indifference curves. His final choice out of the efficient set depends on his attitude towards risk. Figure 4.9 shows the efficient frontier and the indifference map.

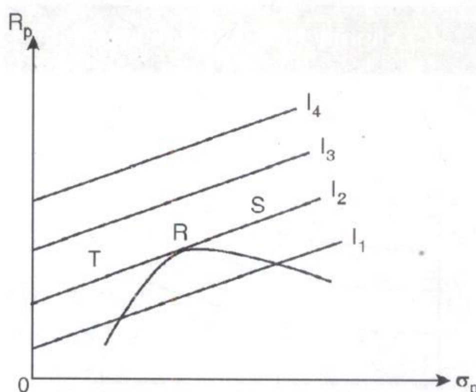


Fig. 4.9 Indifference Map and Efficient Frontier

4.2.3 Indifference Curve and Efficient Frontier

The utility of the investor or portfolio manager increases when he moves up the indifference map from I_1 to I_4. He can achieve higher expected return without an increase in risk. In Figure 4.9, I_2 touches the efficient frontier at point R. Even though the points T and S are in the I_2 curve, R is the only attainable portfolio which maximizes

the utility of the investor. Thus, the point at which the efficient frontier tangentially touches the highest indifference curve determines the most attractive portfolio for the investor.

NOTES

Leveraged portfolios

The investor is assumed to have a certain amount of money to make investment for a fixed period of time. There is no borrowing and lending opportunities. When the investor is not allowed to use the borrowed money, he is denied the opportunity of having financial leverage.

Again, the investor is assumed to be investing only on the risky assets. Riskless assets are not included in the portfolio. To have a leveraged portfolio, investor has to consider not only risky assets but also risk-free assets. Secondly, he should be able to borrow and lend money at a given rate of interest.

Risk-Free Asset

The features of risk-free assets are: (a) absence of default risk and interest risk and (b) full payment of principal and interest amount. The return from the risk-free asset is certain and the standard deviation of the return is nil. The relationship between the rate of return of the risk free asset and risky asset is zero. These types of assets are usually fixed income securities. But fixed income securities issued by private institutions have the chance of default. If the fixed income securities are from the government, they do not possess the default risk and the return from them are guaranteed. Further, the government issues securities of different maturity period, in order to match the length of investors holding period. The risk-free assets may be government securities, treasury bills and time deposits in banks.

Inclusion of risk-free asset: Now, the risk-free asset is introduced and the investor can invest part of his money on risk-free asset and the remaining amount on the risky asset. It is also assumed that the investor would be able to borrow money at risk free rate of interest. When risk-free asset is included in the portfolio, the feasible efficient set of the portfolios is altered. This can be explained in Figure 4.10.

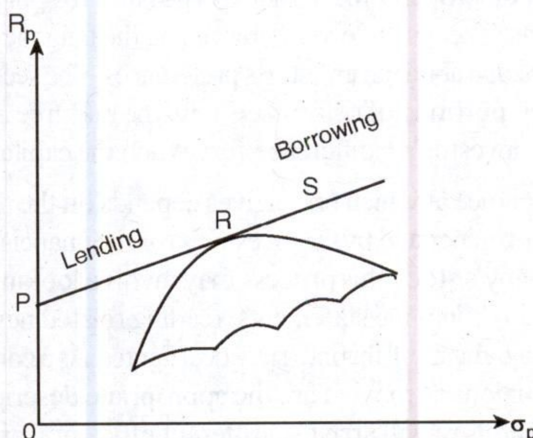


Fig. 4.10 Efficient Frontier with Borrowing and Lending

In Figure 4.10, OP is gained with zero risk and the return is earned through holding risk-free asset. Now, the investor would attempt to maximize his expected

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return and risk relationship by purchasing various combinations of riskless asset and risky assets. He would be moving on the line connecting attainable portfolio R and risk-free portfolio P, i.e., the line PR. When he is on the PR, part of his money is invested in fixed income securities i.e. he has lent some amount of money and invested the rest in the risky asset within the point PR. He is depending upon his own funds. But, if he moves beyond the point R to S he would be borrowing money. Hence the portfolios located between the points RP are lending portfolios and beyond the point R consists of borrowing portfolios. Holding portfolio in PR segment with risk-free securities would actually reduce risk more than the reduction in return.

4.3 PORTFOLIO CHOICE

Portfolio choice involves decisions about the way investors want to hold their assets or to structure their liabilities. It is a fancy term for something we do all the time. From the perspective of macroeconomics, most important cases of portfolio adjustment involve financial assets. You would like to have three characteristics in your financial assets: (i) you would like assets with low risk (ii) you would like assets that are liquid, i.e, assets that can easily be converted to money and spent and (iii) you would like assets that give you a high rate of return. However, no asset combines all the aforementioned three characteristics. Hence, you face tradeoffs. If you want a higher return, you normally have to accept more risk or less liquidity.

Portfolio choice with borrowing constraints

If you cannot borrow funds at the risk-free rate, the efficient frontier of investment opportunities offered by combinations of the risk-free asset and risky assets no longer is a straight line. Rather it is given by the line connecting the risk-free asset and the tangency portfolio and then continues along the upper contour of the opportunity set with risky assets only.

Two fund separation

The two fund separation property means that it is possible to split the portfolio choice problem into two parts. The ûrst involves determining the tangency portfolio and does not require any knowledge about an investor's preferences. The second involves ûnding the optimal mix of this portfolio of risky assets with the risk-free asset by locating the tangency point of the investor's indifference curves and the capital allocation line.

The portfolio choice at which one arrives depends on the data that are used as inputs. These inputs are generated by the investor's (or the ûnancial advisor's) security analysis. For a company's stock this process may involve looking at historical data, examining the company's income statements, reading related news items, and using judgement on how to aggregate all this into statistical ûgures. As a consequence, investors will hold different opinions as to what are the appropriate descriptive statistics for a ûnancial asset and therefore will arrive at different efficient frontiers and tangency portfolios. Different constraints, such as different tax rates, access to borrowing at different rates, or short sales constraints also lead to different efficient frontiers for different types of investors.

Check Your Progress

1. What is a portfolio?
2. What does utility mean?
3. Define a simple diversification.

4.4 SHARPE'S SINGLE AND TWO-FACTORIAL MODELS

NOTES

Casual observation of the stock prices over a period of time reveals that most of the stock prices move with the market index. When the Sensex increases, stock prices also tend to increase and vice-versa. This indicates that some underlying factors affect the market index as well as the stock prices. Stock prices are related to the market index and this relationship could be used to estimate the return on stock. Towards this purpose, the following equation can be used

$R_i = \alpha_i + \beta_i R_m + e_i$

where

R_i - expected return on security *i*

α_i - intercept of the straight line or alpha co-efficient

β_i - slope of straight line or beta co-efficient

R_m - the rate of return on market index

e_i - error term



Error term: The difference between the actual value and the predicted value from the equation

Error term is the difference between the actual value and the predicted value from the equation. The value of error terms is obtained from the ordinary least square method.

According to the equation, the return of a stock can be divided into two components, the return due to the market and the return independent of the market. β_i indicates the sensitiveness of the stock return to the changes in the market return. For **example** β_i of 1.5 means that the stock return is expected to increase by 1.5 per cent when the market index return increases by one percent and vice-versa. Likewise, β_i of 0.5 expresses that the individual stock return would change by 0.5 per cent when there is a change of 1 per cent in the market return. β_i of 1 indicates that the market return and the security return are moving in tandem. The estimates of β_i and α_i are obtained from regression analysis.

The **single index model** is based on the assumption that stocks vary together because of the common movement in the stock market and there are no effects beyond the market (i.e. any fundamental factor effects) that account for the stocks co-movement. Covariance b/w two stocks depends only on the market risk. The expected return, standard deviation and covariance of the single index model represent the joint movement of securities. The mean return is

$R_i = \alpha_i + \beta_i R_m + e_i$

The variance of security's return, $\sigma^2 = \beta_i \sigma_m{}^2 + \sigma_{ei}{}^2$

The covariance of returns between securities *i* and *j* is

$\sigma_{ij} = \beta_i \beta_j \sigma^2{}_m$

so the covariance b/w the two securities is written as above form.

The variance of the security has two components namely, systematic risk or market risk and unsystematic risk or unique risk. The variance explained by the index is referred to systematic risk. The unexplained variance is called residual variance or unsystematic risk.

NOTES

Systematic risk $= \beta_i^2$ x variance of market index.

$= \beta_i^2 \sigma_m^2$

Unsystematic risk = Total variance – Systematic risk.

$e_i^2 = \sigma_i^2$ – systematic risk.

Thus, the total risk= Systematic risk + Unsystematic risk.

$= \beta_i^2 \sigma_m^2 + e_i^2$.

From this, the portfolio variance can be derived

$$\sigma_p^2 = \left[(\sum_{i=1}^{N} x_i\beta_i)^2 \sigma_m^2\right] + \left[\sum_{i=1}^{N} x_i^2 \ e_i^2\right]$$

σ_p^2 = variance of portfolio

σ_m^2 = expected variance of index

e_i^2 = variation in security's return not related to the market index

x_i = the portion of stock *i* in the portfolio

Likewise, expected return on the portfolio also can be estimated. For each security α_i and β_i should be estimated.

$$R_p = \sum_{i=1}^{N} x_i(\alpha_i + \beta_i \ R_m)$$

Portfolio return is the weighted average of the estimated return for each security in the portfolio. The weights are the respective stocks' proportions in the portfolio.

A portfolio's alpha value is a weighted average of the alpha values for its component securities using the proportion of the investment in a security as weight. Portfolio alpha gives the firm specific expected value.

$$\sigma_p = \sum_{i=1}^{N} x_i\alpha_i$$

α_p - Value of the alpha for the portfolio

x_i - Proportion of the investment on security i

α_i - Value of alpha for security i

N - The number of securities in the portfolio

Similarly, a portfolio's beta value is the weighted average of the beta values of its component stocks using relative share of them in the portfolio as weights.

$$\beta_p = \sum_{i=1}^{N} x_i\beta_i$$

β_p is the portfolio beta.

Example 4.1

The following details are given for X and Y companies' stocks and the Bombay Sensex for a period of one year. Calculate the systematic and unsystematic risk for the companies' stocks. If equal amount of money is allocated for the stocks, what would be the portfolio risk?

NOTES

	X Stock	Y Stock	Sensex
Average return	0.15	0.25	0.06
Variance of return	6.30	5.86	2.25
b	0.71	0.27	
Correlation Co-efficient	0.424		
Co-efficient of determination (r^2)	0.18		

The coefficient of determination (r^2) gives the percentage of the variation in the security's return that is explained by the variation of the market index return. In the X company stock return, 18 per cent of variation is explained by the variation of the index and 82 per cent is not explained by the index.

Explained by the index = variance of security return × coefficient of determination

$= 6.3 \times 0.18 = 1.134$

Not explained by the index = Variance of security return × $(1-r^2)$

$= 6.3 \times (1-0.18)$

$= 6.3 \times 0.82 = 5.166$

According to Sharpe, the variance explained by the index is the systematic risk. The unexplained variance or the residual variance is the unsystematic risk.

Company X:

Systematic risk = β^2 x Variance of market index

$= (0.71)^2 \times 2.25$

$= 1.134$

Unsystematic risk = Total variance of security return – systematic risk

$= e_i^2$

$= 6.3 - 1.134$

$= 5.166$

Total risk = $\beta_i^2 \times \sigma_m^2 + e_i^2$

$= 1.134 + 5.166$

$= 6.3$

Company Y:

Systematic risk = $\beta_i^2 \times \sigma_m^2$

$= (0.27)^2 \times 2.25$

$= 0.1640$

Unsystematic risk = Total variance of the security return – systematic risk.

$= 5.86 - 0.1640$

$= 5.696$

$$\sigma_p^2 = \left[\left(\sum_{i=1}^{N} x_i\beta_i\right)^2 \sigma_m^2\right] + \left[\sum_{i=1}^{N} x_i^2 e_i^2\right]$$

NOTES

$$= [(.5 \times .71 + .5 \times .27)^2\, 2.25] + [(.5)^2(5.166)+(.5)^2(5.696)]$$
$$= [(.355 + .135)^2\, 2.25] + [(1.292 + 1.424)]$$
$$= 0.540 + 2.716$$
$$= 3.256$$

4.4.1 Corner Portfolio

The entry or exit of a new stock in the portfolio generates a series of corner portfolios. Any rational investor holds the securities in a portfolio according to their risk tolerance. The risk tolerance moves within a range starting from the lowest level of risk to the higher level. This forms a boundary. In a one stock portfolio, the stock itself is the corner portfolio. In a **two stock portfolio**, the minimum attainable risk (variance) and the lowest return would be the corner portfolio. As the number of stocks increases in a portfolio, the corner portfolio would be the one with lowest return and risk combination.

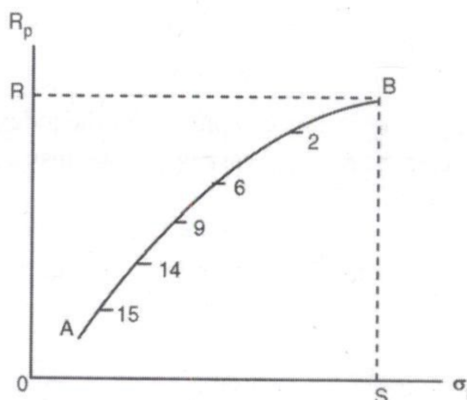


***Fig. 4.11** Corner Portfolio*

In Figure 4.11, AB line shows the risk-return combinations of several portfolios. Each number indicates the number of stocks in the portfolio. When the number of stocks increases, the risk and return decline. Tracing down the AB line shows the corner portfolio. An efficient frontier may have one or two security portfolio at the low or high extremes, if the percentages of allocation to stocks are free to take any value.

4.4.2 Sharpe's Optimal Portfolio

Sharpe had provided a model for the selection of appropriate securities in a portfolio. The selection of any stock is directly related to its excess return-beta ratio.

$$\frac{R_i - R_f}{\beta_i}$$

Where,

R_i = the expected return on stock i

R_f = the return on a riskless asset

β_i = the expected change in the rate of return on stock i associated with one unit change in the market return

The **excess return** is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or treasury bill. The excess return to beta ratio measures the additional return on a security (excess of the riskless asset return) per unit of systematic risk or non-diversifiable risk. This ratio provides a relationship between potential risk and reward.

Ranking of the stocks is done on the basis of their excess return to beta. Portfolio managers would like to include stocks with higher ratios. The selection of the stocks depends on a unique cut-off rate such that all stocks with higher ratios of $R_i – R_f / ß_i$ are included and the stocks with lower ratios are left off. The cut-off point is denoted by C*.

The steps for finding out the stocks to be included in the optimal portfolio are as follows:

1. Find out the 'excess return to beta' ratio for each stock under consideration.
2. Rank them from the highest to the lowest.
3. Proceed to calculate C_i for all the stocks according to the ranked order using the following formula:

$$C_i \frac{\sigma_m^2 \sum_{i=1}^{N} \frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^{N} \frac{\beta_i^2}{\sigma_{ei}^2}}$$

σ_m^2 = variance of the market index

σ_{ei}^2 = variance of a stock's movement that is not associated with the movement of market index i.e. stock's unsystematic risk.

4. The cumulated values of C_i start declining after a particular C_i and that point is taken as the cut-off point and that stock ratio is the cut-off ratio C.

This is explained with the help of an example.

Data for finding out the optimal portfolio are as follows:

Security Number	Mean Return R_i	Excess Return $R_i - R_f$	Beta β	Unsystematic Risk s_{ei}^2	Excess Return to Beta $\frac{R_i - R_f}{\beta_i}$
1	19	14	1.0	20	14
2	23	18	1.5	30	12
3	11	6	0.5	10	12
4	25	20	2.0	40	10
5	13	8	1.0	20	8
6	9	4	0.5	50	8
7	14	9	1.5	30	6

NOTES



Excess return: Excess return is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or treasury bill

NOTES

The riskless rate of interest is 5 per cent and the market variance is 10. Determine the cut-off point.

Security Number 1	$\frac{R_i - R_f}{\beta_i}$ 2	$\frac{(R_i - R_f) \times \beta_i}{\sigma_{ei}^2}$ 3	$\sum_{i=1}^{N} \frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$ 4	$\frac{\beta_i^2}{\sigma_{ei}^2}$ 5	$\sum_{i=1}^{N} \frac{\beta_i^2}{\sigma_{ei}^2}$ 6	C_i 7
1	14	0.7	0.7	0.05	0.05	4.67
2	12	0.9	1.6	0.075	0.125	7.11
3	12	0.3	1.9	0.025	0.15	7.60
4	10	1.0	2.9	0.1	0.25	8.29
5	8	0.4	3.3	0.05	0.3	8.25
6	8	0.04	3.34	0.005	0.305	8.25
7	6	0.45	3.79	0.075	0.38	7.90

C_i calculations are given below

For Security 1

$$C_1 = \frac{10 \times .7}{1 + (10 \times .05)} = 4.67$$

Here 0.7 is got from column 4 and 0.05 from column 6. Since the preliminary calculations are over, it is easy to calculate the C_i.

$$C_2 = \frac{10 \times 1.6}{1 + (10 \times .125)} = 7.11$$

$$C_3 = \frac{10 \times 1.9}{1 + 10(0.15)} = 7.6$$

$$C_4 = \frac{10 \times 2.9}{1 + 10(0.25)} = 8.29$$

$$C_5 = \frac{10 \times 3.3}{1 + 10(0.3)} = 8.25$$

$$C_6 = \frac{10 \times 3.34}{1 + 10(0.305)} = 8.25$$

$$C_7 = \frac{10 \times 3.79}{1 + 10(0.38)} = 7.90$$

The highest C_i value is taken as the cut-off point i.e. C*. The stocks ranked above C* have high excess returns to beta than the cut-off C_i and all the stocks ranked below C* have low excess returns to beta. Here, the cut-off rate is 8.29. Hence, the first four securities are selected. If the number of stocks is larger there is no need to calculate C_i values for all the stocks after the ranking has been done. It can be calculated until the C* value is found and after calculating for one or two stocks below it, the calculations can be terminated.

The C_i can be stated with mathematically equivalent way.

$$C_i = \frac{\beta_{ip}(R_p - R_f)}{\beta_i}$$

NOTES

β_{ip} - the expected change in the rate of return on stock i associated with 1 per cent change in the return on the optimal portfolio.

R_p - the expected return on the optimal portfolio

β_{ip} and R_p cannot be determined until the optimal portfolio is found. To find out the optimal portfolio, the formula given previously should be used. Securities are added to the portfolio as long as

$$\frac{R_i - R_f}{\beta_i} > C_i$$

The above equation can be rearranged with the substitution of equation:

$$C_i = \frac{\beta_{ip}(R_p - R_f)}{\beta_i}$$

Now we have,

$$R_i - R_f > \beta_{ip}(R_p - R_f)$$

The right hand side is the expected excess return on a particular stock based on the expected performance of the optimum portfolio. The term on the left hand side is the expected excess return on the individual stock. Thus, if the portfolio manager believes that a particular stock will perform better than the expected return based on its relationship to optimal portfolio, he would add the stock to the portfolio.

Construction of the optimal portfolio

After determining the securities to be selected, the portfolio manager should find out how much should be invested in each security. The percentage of funds to be invested in each security can be estimated as follows:

$$X_i = \frac{Z_i}{\sum_{i=1}^{N} Z_i}$$

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\frac{R_i - R_f}{\beta_i} - C^*\right)$$

The first expression indicates the weights on each security and they sum up to one. The second shows the relative investment in each security. The residual variance or the unsystematic risk has a role in determining the amount to be invested in each security.

Taking up the previous example

$$Z_1 = \frac{1}{20}(14 - 8.29) = 0.285$$

$$Z_2 = \frac{1.5}{30}(12 - 8.29) = 0.186$$

NOTES

$$Z_3 = \frac{0.5}{10}(12 - 8.29) = 0.186$$

$$Z_4 = \frac{2}{40}(10 - 8.29) = 0.086$$

$$\sum_{i=1}^{N} = 0.285 + 0.186 + 0.186 + 0.086$$

$$= .743$$

$$X_1 = \frac{0.285}{0.743} = 0.38$$

$$X_2 = \frac{0.186}{0.743} = 0.25$$

$$X_3 = \frac{0.186}{0.743} = 0.25$$

$$X_4 = \frac{0.086}{0.743} = 0.12$$

Thus, the proportions to be invested in different securities are obtained. The largest investment should be made in security 1 and the smallest in security 4.

Optimum Portfolio with Short Sales

The procedure used to calculate the optimal portfolio when short sales are allowed is more or less similar to the procedure adopted for no short sales, except the cut-off point concept. At first, the stocks have to be ranked by excess return to beta. Here, all the stocks are added to the portfolio. They are either held long or short. All the stocks affect the cut-off point. The Z value has to be calculated for each stock. If the Z value is positive, the stock will be held long and if negative, it will be sold short. Stocks which are having excess return to beta above C* are held long as in the case of the portfolio without short sales. Stocks with an excess return to beta below C* are sold short. In the case of previous example $C^* = C_7 = 7.9$, if short sales are permitted, then

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\frac{R_i - R_f}{\beta} - C^*\right)$$

$$Z_1 = \frac{1}{20}(14 - 7.9) = 0.305$$

$$Z_2 = \frac{1.5}{30}(12 - 7.9) = 0.205$$

$$Z_3 = \frac{0.5}{10}(12 - 7.9) = 0.205$$

$$Z_4 = \frac{2}{40}(10 - 7.9) = 0.105$$

$$Z_5 = \frac{1}{20}(8 - 7.9) = 0.005$$

Check Your Progress

4. What do you understand by portfolio choice?
5. What does the two- fund separation property mean?
6. What happens when Sensex level goes upward?
7. What is an error term?

$$Z_6 = \frac{0.5}{50}(8 - 7.9) = 0.001$$

$$Z_7 = \frac{1.5}{30}(6 - 7.9) = -0.095$$

NOTES

The seventh stock will be sold short.

The proportion can be had using:

$$X_i = \frac{Z_i}{\sum_{i=1}^{N} Z_i}$$

4.5 LAGRANGE MULTIPLIER METHOD



Portfolio theory: Portfolio theory deals with the problem of constructing for a given collection of assets an investment with desirable features

Portfolio theory deals with the problem of constructing for a given collection of assets an investment with desirable features. A variety of different asset characteristics can be taken into consideration, such as the amount of value, on average, an asset returns on over a period of time and the riskiness of reaping returns comparable to the average. The financial objectives of the investor and tolerance of risk determine what types of portfolios are to be considered desirable. Lagrange's method is used to delineate efficient frontier of the (all possible combination of risky assets) opportunity set. Selection of an individual portfolio on that efficient frontier requires the measurement of risk tolerance level (T) for the individual investor through other methods.

To illustrate this, one of the most common problems is that of finding maxima or minima of a function. It is often difficult to find a closed form for the function when one wishes to maximize or minimize a function subject to fixed outside conditions or constraints. The method of Lagrange multipliers provides us with a powerful tool for solving this class of problems without the need to explicitly solve the conditions and use them to eliminate extra variables.

Let us see how Lagrange multipliers are used. Suppose we walk along the contour line with 'g = c'. We can visualize the contour of g given by

g(x, y) = c.

In general the contour lines of any other function 'f' and 'g' may be distinct, so following the contour line for 'g = c' one could intersect with or cross the contour lines of 'f' i.e. while moving along the contour line for 'g = c'the value of 'f' can vary. We can visualize contours of *f*, for various values of d, given by

f(x, y) = d

The respective gradients of 'f' and 'g' are described by the equations below:

$$\nabla_{x,y} f = \left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}\right)$$

and

$$\nabla_{x,y} g = \left(\frac{\partial g}{\partial x}, \frac{\partial g}{\partial y}\right)$$

NOTES

The contour lines of f and g touch when the tangent vectors of the contour lines are parallel. Only when the contour line for 'g = c' meets contour lines of 'f' tangentially (when the contour lines touch but do not cross), the value of 'f' does not increase or decrease.

Since the gradient of a function is perpendicular to the contour lines, this is the same as saying that the gradients of Δf and Δg are parallel. This happens at the optimal 'x'. The geometrical condition about the gradients is expressed as requiring that there is a constant, traditionally called λ (Lagrange Multiplier), so that

$$\Delta f = \lambda\, \Delta g$$

The constant λ is required because although the two gradient vectors are parallel, the magnitudes of the gradient vectors are generally not equal. If there are 'm' constraints $g_k(x) = c_k$, then there is a separate Lagrange multiplier for each constraint:

$$\nabla f = \sum_{k=1}^{m} \lambda_k \nabla g_k .$$

In the equation above, the 'n+m' unknown variables are the 'n' original 'x_i' and the 'm' Lagrange multipliers 'λ_k'. The equations are the 'm' equations $g_k(x) = c_k$ and the system of 'n' equations. In general, a collection of unknown variables is determined by the same number of equations.

Since the gradient of a function is perpendicular to the contour lines, this is the same as saying that the gradients of f and g are parallel. Thus we want points (x, y)) where g (x, y) = c and $\nabla_{x,y} f = -\lambda \nabla_{x,y} g$. To incorporate these conditions into one equation, we introduce an auxiliary function

$$\Lambda(x, y, \lambda) = f(x, y) + \lambda \cdot \big(g(x, y) - c\big),$$

and solve

$$\nabla_{x,y,\lambda} \Lambda(x, y, \lambda) = 0.$$

This is the method of Lagrange multipliers. Note that $\nabla_\lambda \Lambda(x, y, \lambda) = 0$ implies $g(x, y) = c$.

Calculating the minimum variance portfolio

Every possible asset combination can be plotted in risk-return space, and the collection of all such possible portfolios defines a region in this space. The line along the upper edge of this region is known as the efficient frontier. Combinations along this line represent portfolios (explicitly excluding the risk-free alternative) for which there is lowest risk for a given level of return. Conversely, for a given amount of risk, the portfolio lying on the efficient frontier represents the combination offering the best possible return. Mathematically the efficient frontier is the intersection of the set of portfolios with minimum variance and the set of portfolios with maximum return. The solution to this type of problem is similar to the solution of walking along the contour line described earlier.

NOTES

Let us look at a portfolio problem. If we were to envision forming a portfolio from two risky assets 'A' and 'B', we need to understand how the uncertainties of asset returns interact. It turns out that the key determinant of portfolio risk is the extent to which the returns on the two assets tend to vary either in tandem or in opposition. The degree to which a two-risky-assets portfolio reduces variance of returns depends on the degree of correlation between the returns of the securities.

In Markowitz portfolio models, we assume investors choose portfolios based on both expected return, $E(r_p)$, and the standard deviation of return as a measure of its risk, $\sum_p$. So, the portfolio selection problem can be expressed as maximizing the return with respect to the risk of the investment (or, alternatively, minimizing the risk with respect to a given return, hold the return constant and solve for the weighting factors that minimize the variance).

Mathematically, the portfolio selection problem can be formulated as quadratic program. For two risky assets A and B, the portfolio consists of w_A, w_B, the return of the portfolio is then, The weights should be chosen so that (for example) the risk is minimized, that is

$$\operatorname*{Min}_{w_A} \ \sigma_P^2 = w_A^{\ 2}\sigma_A^{\ 2} + w_B^{\ 2}\sigma_B^{\ 2} + 2w_A w_B \rho_{AB}\sigma_A\sigma_B$$

for each chosen return and subject to

$$w_A + w_B = 1,\ w_A \geq 0,\ w_B \geq 0$$

The last two constraints simply imply that the assets cannot be in short positions. The minimum variance portfolio weights are shown in Table 4.4.

Table 4.4 *The Mimimum Variance Portfolio Weight of Two-Assets Portfolio without Short Selling*

The correlation of two assets	Weight of Asset A	Weight of Asset B
ρ= 1	$w_A = \dfrac{\sigma_B}{\sigma_A - \sigma_B}$	$w_B = \dfrac{\sigma_A - 2\sigma_B}{\sigma_A - \sigma_B}$
ρ= -1	$w_A = \dfrac{\sigma_B}{\sigma_A + \sigma_B}$	$w_B = \dfrac{\sigma_A}{\sigma_A + \sigma_B}$
ρ= 0	$w_A = \dfrac{\sigma_B^2}{\sigma_A^2 + \sigma_B^2}$	$w_B = \dfrac{\sigma_A^2 - 2\sigma_B^2}{\sigma_A^2 + \sigma_B^2}$

Above, we simply use two-risky-assets portfolio to calculate the minimum variance portfolio weights. If we generalization to portfolios containing N assets, the minimum portfolio weights can then be obtained by minimizing the Lagrange function *C* for portfolio variance.

$$\text{Min } \sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij}\sigma_i\sigma_j$$

NOTES

Subject to $w_1 + w_2 + ... + w_N = 1$

$$C = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \text{Cov}\left(r_i r_j\right) + \lambda_1\left(1 - \sum_{i=1}^{n} W_i\right)$$

in which

λ_1 are the Lagrange multipliers, respectively,

ρ_{ij} is the correlation coefficient between i

w_i = the proportion of the funds invested in security i; and

r_i, r_p = the return on ith security and portfolio p

By using this approach the minimum variance can be computed for any given level of expected portfolio return (subject to the other constraint that the weights sum to one). In practice it is best to use a computer because of the explosive increase in the number of calculations as the number of securities considered grows. The efficient set that is generated by the aforementioned approach is sometimes called the *minimum-variance set* because of the minimizing nature of the Lagrangian solution.

Lagrangean Process is demonstrated by taking as 3 assets portfolio. Let the return, risk and correlation coefficients of returns between the different pairs of assets be as under.

Return and Risk Figures

Assets	Return (%)	Risk
1	14	6% or 0.06
2	18	7% or 0.07
3	22	9% or 0.09

Given $r_{1,2} = 0.8$; $r_{1,3} = 0.42$; $r_{3,2} = 0.2$. The covariance (σ_i, σ_j, r_{ij}) matrix as:

	1	2	3
1	0.004	0.003	0.002
2	0.003	0.005	0.001
3	0.002	0.001	0.008

Let x_1, x_2 and x_3 be the weight of the 1st, 2nd and 3rd asset in the portfolio.

Then,

$$x_1 + x_2 + x_3 = 1$$

Let our target portfolio return (T_{pr}) be 19%. Our task is finding the values of W_1, W_2 and W_3 such that portfolio return is 19%, but risk is the least. We use Lagrangian process here.

Check Your Progress

8. What is the use of Lagrange's method?
9. What does portfolio theory deal with?

NOTES

(*i*) The portfolio return equation is

$r_p = 0.14x_1 + 0.18x_2 + 0.22(1 - x_, - x_2)$

$= 0.14x_1 + 0.18x_2 + 0.22 - 0.22x_1 - 22x_2$

$= 0.18x_1 - 0.04x_2 - 0.22.$

Setting this as equal to 19% or 0.19, we get

$0.19 = [0.08x_1 + 0.04x_2 - 0.22]$

$T_{pr} - r_p = 0.08x_1 + 0.08x_2 - 0.03 = 0$

(*ii*) The portfolio variance amounts to

$$\sigma_p^2 = 0.004x_1^2 + 0.005x_2^2 + 0.008(1 - x_1 - x_2)^2 + 2 \times 0.003 \times x_1 \times x_2$$

$$+ 2 \times (0.002) \times (x_1)(1 - x_1 - x_2) + 2 \times (0.001) \times (x_2)(1 - x_1 - x_2)$$

$$= 0.004x_1^2 + 0.005x_2^2 + 0.008 + 0.008x_1^2 + 0.008x_2^2 - 0.016x_1$$

$$+ 0.016x_1x_2 - 0.016x_2 + 0.006x_1x_2 + 0.004x_1 - 0.004x_1^2$$

$$- 0.004x_1x_2 + 0.002x_2 - 0.002x_1x_2 - 0.002x_2$$

$$= 0.008x_1^2 + 0.00x_2^2 - 0.012x_1 - 0.014x_2 + 0.016x_1x_2 + 0.008$$

We have to minimize σ_p^2 subject to target return condition. So, our objective function as per the Lagrangian Process is:

Minimize $Z = \sigma_p^2 + L(T_{pr} - r_p)$,

where L, Lamda, is Lagrangian Multiple.

That is Minimize $Z = 0.008x_1^2 + 0.011x_2^2 - 0.012x_1 - 0.014x_2$

$$+ 0.016x_1x_2 + 0.008 + L(0.08x_1 + 0.04x_2 - 0.03)$$

When we minimize Z, the Lagrangian Multiplier will ensure return constraint is always satisfied.

Using partial differential, values of x_1, x_2 and L for which Z will be minimum can be found. The same is done below:

$$\frac{dz}{dx_1} = 0.016x_1 + 0.016x_2 + 0.08L - 0.012 = 0 \quad (1)$$

$$\frac{dz}{dx_2} = 0.16x_1 + 0.022x_2 + 0.04L - 0.014 = 0 \quad (2)$$

$$\frac{dz}{dL} = 0.08x_1 + 0.04x_2 - 0.03 = 0 \quad (3)$$

We have to simultaneously solve these three equations to get the values of x_1, x_2 and L.

NOTES

Eqn. (1) × 1 gives	$0.016x_1 + 0.016x_2 + 0.08L = 0.012$	(4)
Eqn. (2) × 2 gives	$0.32x_1 + 0.044x_2 + 0.08L = 0.028$	(5)
Eqn. (4) – (5) gives	$-0.016x_1 - 0.028x_2 = -0.016$	(6)
Eqn. (3) × 0.2 gives	$0.016x_1 + 0.008x_2 = 0.006$	(7)
Eqn. (6) + (7) gives	$-0.02x_2 = -0.010$	
So,	$x_2 = 0.5$	

Putting the value of $x_2 = 0.5$ in equation 3, to get,

$0.08x_1 + 0.04(.5) = 0.03$

or $\quad 0.08x_1 = 0.01$

or $\quad x_1 = 0.125$

$x_3 = 1 - 0.125 - 0.5 = 0.375$

and $\quad L = 0.025$

The portfolio variance will be 0.003375 or 33.75 percentage squared. So, portfolio std. deviation = 5.8%. So, to get a target return of 19% , investment in the 3 securities should be in the order of 12.5%, 50% and 37.5% . And this will result in a portfolio minimum std. deviation of 5.8%.

The value of $L = 0.025$ and this refers to incremental rate of change in the value of objective function, namely portfolio variance resulting from small change in the constraint, viz., the target return.

4.6 SUMMARY

Some of the important concepts discussed in this unit are:

- Markowitz developed algorithms to minimize portfolio risk. Diversification reduces the unsystematic risk component of the portfolio.
- The level of risk exposure is measured with the help of the standard deviation of the returns. The expected return is the weighted sum of the expected returns of the portfolio, the weights being the probabilities of their occurrence.
- If securities with less-than-perfect positive correlation between their price movements are combined risk can be reduced considerably. The risk would be nil or the standard deviation would be zero if two securities have perfect negative correlation. Risk cannot be reduced if the securities have perfect positive correlation.
- Many portfolios may be attainable. But some portfolios are attractive because they give more return for the same level of risk or same return with lesser level of risk. These portfolios form the efficient frontier.
- Utility curves of the investor decide the most efficient portfolio.
- In a levered portfolio, a investor is permitted to borrow and lend. Risk-free assets are also added with risky assets and they would minimize risk.
- The Sharpe model is based on the security's return relationship with the index return. Beta is the deciding factor in measuring the systematic risk. The systematic and unsystematic risk can be computed with the Sharpe model.

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- Stock prices move with the market index. When the Sensex increases, stock prices also tend to increase and vice-versa.
- Return of stock can be divided into two components, the return due to the market and the return independent of the market.
- The Single Index Model is based on the assumption that stocks vary together because of the common movement in the stock market and there are no effects beyond the market that account the stocks co-movement.
- Selection of any stock is directly related to its excess return to beta ratio.
- The excess return is the difference between the expected return on the stock and the riskless rate of interest such as the rate offered on the government security or treasury bill. The excess return to beta ratio measures the additional return on a security per unit of systematic risk or non-diversifiable risk.
- Ranking of stocks is done on the basis of their excess return to beta.
- Using the Sharpe model, portfolio return and risk can be computed more easily as compared to the Markowitz model.

4.7 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Portfolio is a group of assets owned by an investor.
2. Utility is the satisfaction which an investor enjoys from the portfolio return.
3. A simple diversification is a naïve type of diversification in which securities are chosen without any logical and analytical procedures.
4. Portfolio choice involves decisions about the way investors want to hold their assets or to structure their liabilities.
5. The two- fund separation property means that it is possible to split the portfolio choice problem into two parts. The ûrst involves determining the tangency portfolio and does not require any knowledge about an investor's preferences. The second involves ûnding the optimal mix of this portfolio of risky assets with the risk-free asset by locating the tangency point of the investor's indifference curves and the capital allocation line.
6. When the Sensex level goes upward the stock prices also tend to go up.
7. An error term is a difference between the actual value and the predicted value.
8. The Lagrange's method is used to outline the official frontier of opportunity set.
9. The portfolio theory deals with the problem of constructing for a given collection of assets and investment with desirable features.

4.8 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What does a portfolio consist of?
2. How does simple diversification reduce the risk of portfolios?

NOTES

3. What is an optimal portfolio?
4. What does correlation coefficient indicate?
5. What are the problems in the Markowitz model in comparison to the Sharpe index model?
6. How can one estimate the return of stock with respect to stock prices and market index?

Long-Answer Questions

1. What do you understand by portfolio diversification? Elaborate.
2. Describe Markowitz diversification. What is Markowitz model?
3. Discuss the utility analysis and draw a figure to show the utility curves.
4. Evaluate the Sharpe's single and two-factorial models.
5. Explain the Lagrange multiplier method.

UNIT 5 CAPITAL ASSET PRICING MODEL

NOTES

Structure

5.0 INTRODUCTION

In this unit, you will learn about the capital asset pricing model (CAPM) on investment risks. CAPM, based on Harry Markowitz's work on diversification and modern portfolio theory, was introduced by Jack Treynor, William Sharpe, John Lintner and Jan Mossin independently in the 1960s. Markowitz and Merton Miller jointly received the Nobel Prize in Economics for this contribution. CAPM is a model for pricing an individual security or a portfolio. For individual securities, the security market line (SML) and its relation to expected return and systematic risk (beta—the measure of an individual investment's or portfolio's sensitivity to the movement in the market.) are used. This shows how the market must price individual securities in relation to their security risk class. SML helps in calculating the reward-to-risk ratio for any security in relation to that of the overall market. Investors are interested in knowing the systematic risk when they search for efficient portfolios. They would like to have assets with low beta coefficients, i.e., systematic risk. The capital asset pricing theory helps the investors to understand the risk and return relationship of the securities. It also explains how assets should be priced in the capital market.

In this unit, you will also study the efficient market theory. The efficient market hypothesis (EMH) asserts that financial markets are 'informationally efficient'. It implies that you cannot always achieve returns in excess of average market returns on a risk-adjusted basis, given the information available at the time you have made the investment. There are three main versions of the hypothesis: 'weak', 'semi-strong' and 'strong'. The weak-form EMH claims that prices on traded assets, such as stocks and bonds, already reflect all past publicly available information. The semi-strong form EMH claims

both that prices reflect all publicly available information and that prices instantly change to reflect new public information. The strong-form EMH additionally claims that prices instantly reflect even hidden or 'insider' information.

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5.1 UNIT OBJECTIVES

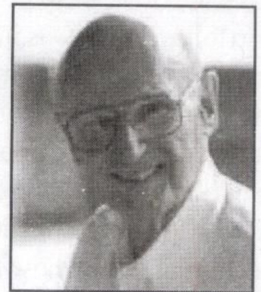
After going through this unit, you will be able to:

- Understand the basic structure of Capital Asset Pricing Model (CAPM)
- Analyse the Arbitrage Pricing Theory (APT)
- Differentiate between the weak form, semi-strong form and strong-form of efficient market hypothesis
- Define the Random Walk Theory
- Compare APT and CAPM

5.2 CAPITAL ASSET PRICING MODEL: ASSUMPTIONS AND APPLICATIONS

Harry Markowitz, William Sharpe, John Lintner and Jan Mossin provided the basic structure for the Capital Asset Pricing Model (CAPM) theory. It is a model of linear general equilibrium return. In the CAPM theory, the required rate return of an asset is having a linear relationship with asset's beta value, i.e., undiversifiable or systematic risk.

Harry Markowitz was born on Aug. 24, 1927 in Chicago. During high school, Markowitz developed an interest in physics and philosophy. After completing his B.A., Markowitz decided to receive specialization in economics. Markowitz chose to apply mathematics to the analysis of the stock market as the topic for his dissertation. While researching the then current understanding of stock prices, Markowitz realized that the theory lacked an analysis of the impact of risk. This insight led to the development of his seminal theory of portfolio allocation under uncertainty. Markowitz won the Nobel Prize in Economics in 1990.



5.2.1 Assumptions of CAPM Theory

The CAPM theory is based on the following assumptions:

- An individual seller or buyer cannot affect the price of a stock. This assumption is the basic assumption of the perfectly competitive market.
- Investors make their decisions only on the basis of the expected returns, standard deviations and covariances of all pairs of securities.
- Investors are assumed to have homogenous expectations during the decision-making period.

NOTES

- The investor can lend or borrow any amount of funds at the riskless rate of interest. The riskless rate of interest is the rate of interest offered for the treasury bills or government securities.
- Assets are infinitely divisible. According to this assumption, investors could buy any quantity of share.
- There is no transaction cost, i.e., no cost is involved in buying and selling of stocks.
- There is no personal income tax. Hence, the investor is indifferent to the form of return.
- Unlimited quantum of short sales is allowed. An individual can sell short any amount of shares.



William Sharpe was born on June 16, 1934 in Boston, Massachusetts. As his father was in the National Guard, the family moved several times during World War II, until they finally settled in Riverside, California. Sharpe spent the rest of his childhood and teenage in Riverside, also completing most of his pre-college education there. In 1951 he enrolled at the University of California at Berkeley planning to pursue a degree in medicine. However, in the first year, he decided to change his focus and moved to the University of California at Los Angeles to study Business Administration. Finding that he was not interested in accounting, Sharpe had a further change in preferences, finally majoring in Economics.

5.2.2 Lending and Borrowing

It is assumed that the investor could borrow or lend any amount of money at riskless rate of interest. When this opportunity is given to the investors, they can mix risk free assets with the risky assets in a portfolio to obtain a desired rate of risk-return combination.

The expected return on the combination of risky and risk free combination is as follows:

$$R_p = R_f X_f + R_m(1 - X_f)$$

Where :

R_p = Portfolio return

X_f = The proportion of funds invested in risk free assets

$1–X_f$ = The proportion of funds invested in risky assets

R_f = Risk free rate of return

R_m = Return on risky assets

This formula can be used to calculate the expected returns for different situations, such as mixing riskless assets with risky assets, investing only in the risky asset and mixing the borrowing with risky assets.

NOTES

Now, let us assume that borrowing and lending rate to be 12.5 per cent and the return from the risky assets to be 20 per cent. There is a trade off between the expected return and risk. If an investor invests in risk free assets and risky assets, his risk may be less than what he invests in the risky asset alone. But if he borrows to invest in risky assets, his risk would increase more than he invests his own money in the risky assets. When he borrows to invest, we call it financial leverage. If he invests 50 per cent in risk free assets and 50 per cent in risky assets, his expected return of the portfolio would be:

$$
\begin{aligned}
R_p &= R_f X_f + R_m (1 - X_f) \\
&= 12.5 \times .5 + 20 (1 - .5) \\
&= 6.25 + 10 \\
&= 16.25\%
\end{aligned}
$$

If there is a zero investment in the risk free asset and 100 per cent in the risky asset, the return is as follows:

$$
\begin{aligned}
R_p &= R_f X_f + R_m (1 - X_f) \\
&= 0 + 20\% \\
&= 20\%
\end{aligned}
$$

If – .5 in risk free asset and 1.5 in risky asset, the return is

$$
\begin{aligned}
R_p &= R_f X_f + R_m (1 - X_f) \\
&= (12.5 \times -.5) + 20 \times 1.5 \\
&= -6.25 + 30 \\
&= 23.75
\end{aligned}
$$



John Virgil Lintner was a professor at the Harvard Business School in the 1960s. He was one of the co-creators of the capital asset pricing model. In 1956, he developed this theory based on two important things that he observed about dividend policy:

(i) Companies have the tendency to fix long-run target dividends-to-earnings ratios depending on the amount of positive net-present-value (NPV) projects they have available.

(ii) Increases in earnings are not always sustainable. As a consequence, dividend policy is not changed until managers can see that new earnings levels are sustainable.

The variance of the above mentioned portfolio can be calculated by using the equation.

$$\sigma^2_p = \sigma^2_f X_f^2 + \sigma^2_m (1 - X_f)^2 + 2\,\mathrm{Cov}_{fm} X_f (1 - x_f)$$

The previous example can be taken for the calculation of the variance. The variance of the risk free asset is zero. The variance of the risky asset is assumed to be 15. Since the variance of the risk-free asset is zero, the portfolio risk solely depends on the portion of investment on risky asset.

Table 5.1 *Calculation of Variance*

Proportion in risky asset $(1-X_f)$	Portfolio risk
0.5	7.5
1.0	15
1.5	22.5

NOTES

The risk is more in the borrowing portfolio being 22.5 per cent and the return is also high among the three alternatives. In the lending portfolio, the risk is 7.5 per cent and the return is also the lowest. The risk premium is proportional to risk, where the risk premium of a portfolio is defined as the difference between $R_p - R_f$, i.e., the amount by which a risky rate of return exceeds the riskless rate of return.

Table 5.2 *Risk-Return Trade Off*

Portfolio Return R_p	Risk-free Return R_f	Risk Premium $R_p - R_f$	Portfolio Risk σ_P	Factor of Proportionality $(R_p - R_f)/\sigma_P$
16.25	12.5	3.75	7.5	0.5
20.0	12.5	7.5	15.0	0.5
23.75	12.5	11.25	22.5	0.5

The risk-return proportionality ratio is a constant .5, indicating that one unit of risk premium is accompanied by 0.5 unit of risk.

Jan Mossin was born in 1936 and graduated from NHH (Norwegian School of Economics and Business Administration) in 1959. He obtained an MS in 1964, and was awarded the Ph.D. by Carnegie Institute of Technology (now Carnegie-Mellon University) in1968. Jan Mossin's exciting research scores highly both on quality and originality, as evidenced by his many innovative articles in top economic journals.



5.2.3 Capital Market Line (CML) and Security Market Line (SML)

According to CAPM, all investors hold only the market portfolio and riskless securities. The market portfolio is a portfolio comprised of all stocks in the market. Each asset is held in proportion to its market value to the total value of all risky assets. For example, if Reliance Industry share represents 20 per cent of all risky assets, then the market portfolio of the individual investor contains 20 per cent of Reliance Industry shares. At this stage, the investor has the ability to borrow or lend any amount of money at the riskless rate of interest. The efficient frontier of the investor is given in Figure 5.1.

The Figure 5.1 shows the efficient frontier of the investor. The investor prefers any point between B and C because, with the same level of risk they face on line BA, they are able to get superior profits. The ABC line shows the investor's, portfolio of risky assets. The investors can combine riskless asset either by lending or borrowing. This is shown in Figure 5.2.

NOTES

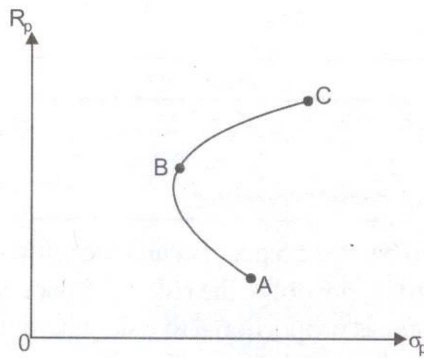


Fig. 5.1 Efficient Frontier

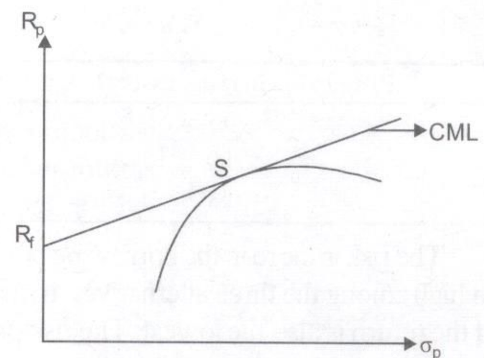


Fig. 5.2 The Capital Market Line

The line R_fS represents all possible combination of riskless and risky asset. The 'S' portfolio does not represent any riskless asset but the line RS_f gives the combination of both. The portfolio along the path R_FS is called lending portfolio, that is some money is invested in the riskless asset or may be deposited in the bank for a fixed rate of interest. If it crosses the point S, it becomes borrowing portfolio. Money is borrowed and invested in the risky asset. The straight line is called capital market line (CML). It gives the desirable set of investment opportunities between risk free and risky investments. The **CML** represents linear relationship between the required rates of return for efficient portfolios and their standard deviations.



CML: Represents linear relationship between the required rates of return for efficient portfolios and their standard deviations

$$E(R_p) = R_f + \left(\frac{R_m - R_f}{\sigma_m}\right)\sigma_p$$

$E(R_p)$ = portfolio's expected rate of return

R_m = expected return on market portfolio

σ_m = standard deviation of market portfolio

σ_p = standard deviation of the portfolio

For a portfolio on the capital market line, the expected rate of return in excess of the risk free rate is in proportion to the standard deviation of the market portfolio. The price of the risk is given by the slope of the line. The slope equals the risk premium for the market portfolio $R_m - R_f$ divided by the risk or standard deviation of the market portfolio. Thus, the expected return of an efficient portfolio is

Expected return = Price of time + (Price of risk × Amount of risk)



Price of time: The risk free rate of return

Price of time is the risk free rate of return. Price of risk is the premium amount higher and above the risk free return.

Security market line (SML)

The risk-return relationship of an efficient portfolio is measured by the capital market line. But, it does not show the risk-return trade off for other portfolios and individual securities. Inefficient portfolios lie below the capital market line and the risk-return relationship cannot be established with the help of the capital market line. Standard deviation includes the systematic and unsystematic risk. Unsystematic risk can be diversified and it is not related to the market. If the unsystematic risk is eliminated, then the matter of concern is systematic risk alone. This systematic risk could be measured by beta. The beta analysis is useful for individual securities and portfolios whether efficient or inefficient.

When an additional security is added to the market portfolio, an additional risk is also added to it. The variance of a portfolio is equal to the weighted sum of the covariances of the individual securities in the portfolio. If we add an additional security to the market portfolio, its marginal contribution to the variance of the market is the covariance between the security's return and market portfolio's return. If the security i is included, the covariance between the security and the market measures the risk. Covariance can be standardised by dividing it by standard deviation of market portfolio Cov_{im}/σ_m. This shows the systematic risk of the security. Then, the expected return of the security i is given by the equation:

$$R_i - R_f = \frac{R_m - R_f}{\sigma_m} COV_{im} / \sigma_m$$

This equation can be rewritten as follows

$$R_i - R_f = \frac{COV_{im}}{\sigma_m^2}[R_m - R_f]$$

The first term of the equation is nothing but the beta coefficient of the stock. The beta coefficient of the equation of SML is same as the beta of the market (single index) model. In equilibrium, all efficient and inefficient portfolios lie along the security market line. The SML line helps to determine the expected return for a given security beta. In other words, when betas are given, we can generate expected returns for the given securities. This is explained in Figure 5.3.

If we assume the expected market risk premium to be 8 per cent and the risk free rate of return to be 7 per cent, we can calculate expected return for A, B, C and D securities using the formula

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f]$$

If beta for β = 1

= 7 + 1 (8)

= 15%

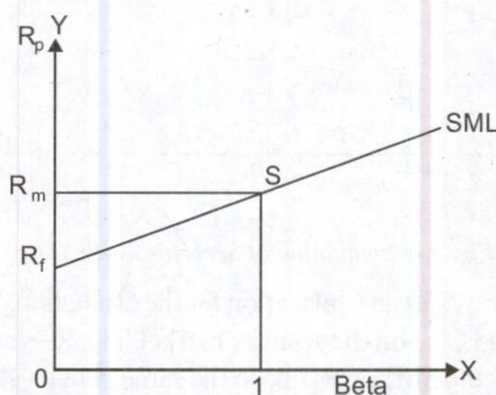


Fig. 5.3 Security Market Line

Security A

Beta = 1.10

E (R) = 7 + 1.10 (8)

= 15.8

NOTES

Security B

Beta = 1.20

E(R) = 7 + 1.20 (8)

= 16.8 = 16.6

Security C

Beta = .7

E(R) = 7 + .7 (8)

= 12.6

The same can be found out easily from the Figure 5.3 too. All we have to do is to mark the beta on the horizontal axis and draw a vertical line from the relevant point to touch the SML line. Then from the point of intersection, draw another horizontal line to touch the Y axis. The expected return could be very easily read from the Y axis. The securities A and B are aggressive securities, because their beta values are greater than one. When beta values are less than one, they are known as defensive securities. In our example, security C has the beta value less than one.

Evaluation of securities

Relative attractiveness of the security can be found out with the help of security market line. Stocks with high risk factor is expected to yield more return and vice-versa. But the investor would be interested in knowing whether the security is offering return more or less proportional to its risk.

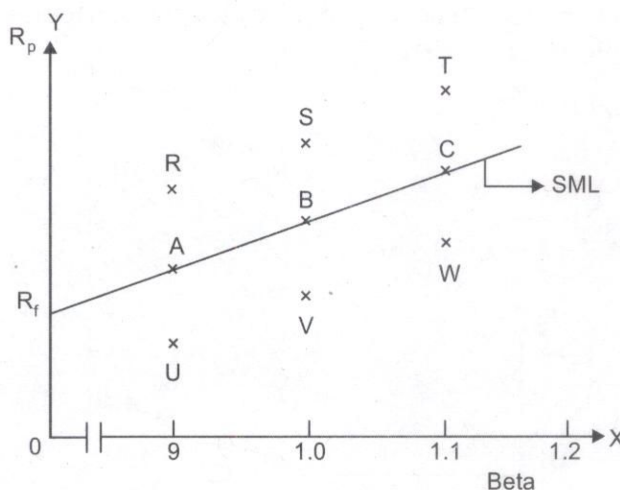


Fig. 5.4 Evaluation of Securities with SML

The Figure 5.4 provides an explanation for the evaluation. There are nine points in the diagram. A, B and C lie on the security market line, R, S and T above the SML and U, V and W below the SML. ARU have the same beta level of .9. Likewise beta values of SBV = 1.00 and TCW = 1.10. The stocks above the SML yield higher returns for the same level of risk. They are underpriced compared to their beta value. With the simple rate of return formula, we can prove that they are undervalued.

$$R_i = \frac{P_i - P_o + Div}{P_o}$$

P_i is the present price

P_O - the purchase price and

Div - Dividend.

When the purchase price is low i.e. when the denominator value is low, the expected return could be high. Applying the same principle the stocks U, V and W can be classified as overvalued securities and are expected to yield lower returns than stocks of comparable risk. The denominator value may be high i.e. the purchase price may be high. The prices of these scrips may fall and lower the denominator. There by, they may increase the returns on securities.

The securities A, B and C are on the line. Therefore considered to be appropriately valued. They offer returns in proportion to their risk. They have average stock performance, since they are neither undervalued nor overvalued.

5.2.4 Market Imperfection and SML

Information regarding the share price and market condition may not be immediately available to all investors. Imperfect information may affect the valuation of securities. In a market with perfect information, all securities should lie on SML. Market imperfections would lead to a band of SML rather than a single line. Market imperfections affect the width of the SML to a band. If imperfections are more, the width also would be larger. SML in imperfect market is given in Figure 5.5.

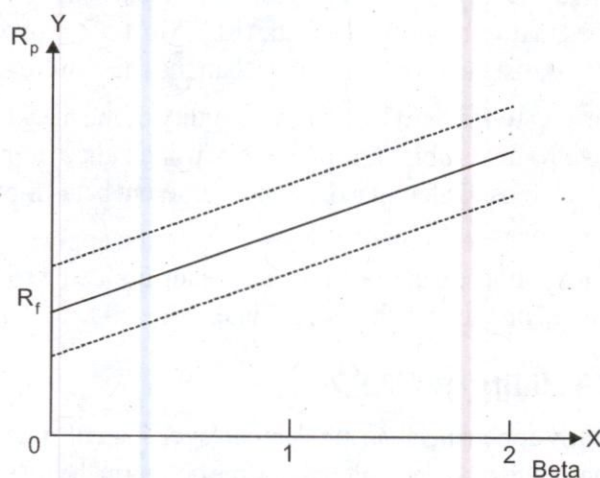


Fig. 5.5 SML in Imperfect Market

5.2.5 Empirical Tests of the CAPM

In the CAPM, beta is used to estimate the systematic risk of the security and reflects the future volatility of the stock in relation to the market. Future volatility of the stock is estimated only through historical data. Historical data are used to plot the regression line or the characteristic line and calculate beta. If historical betas are stable over a period of time, they would be good proxy for their ex-ante or expected risk.

Robert A. Levy, Marshall E. Blume and others have studied the question of beta stability indepth. Levy calculated betas for both individual securities and portfolios. His study results have provided the following conclusions:

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- The betas of individual stocks are unstable, hence the past betas for the individual securities are not good estimators of future risk.
- The betas of portfolios of ten or more randomly selected stocks are reasonably stable, hence the past portfolio betas are good estimators of future portfolio volatility. This is because of the errors in the estimates of individual securities' betas tend to offset one another in a portfolio.

  Various researchers have attempted to find out the validity of the model by calculating beta and realised rate of return. They attempted to test (1) whether the intercept is equal to R_f i.e. risk free rate of interest or the interest rate offered for treasury bills (2) whether the line is linear and pass through the beta = 1 being the required rate of return of the market. In general, the studies have showed the following results.

- The studies generally showed a significant positive relationship between the expected return and the systematic risk. But the slope of the relationship is usually less than that of predicted by the CAPM.
- The risk and return relationship appears to be linear. Emprical studies give no evidence of significant curvature in the risk/return relationship.
- The attempt of the researchers to assess the relative importance of the market and company risk have yielded definite results. The CAPM theory implies that unsystematic risk is not relevant, but unsystematic and systematic risks are positively related to security returns. Higher returns are needed to compensate both the risks. Most of the observed relationship reflects statistical problems rather than the true nature of capital market.
- According to Richard Roll, the ambiguity of the market portfolio leaves the CAPM untestable. The practice of using indices as proxies are loaded with problems. Different indices yield different betas for the same security.
- If the CAPM were completely valid, it should apply to all financial assets including bonds. But, when bonds are introduced into the analysis, they do not fall on the security market line.

5.2.6 Present Validity of CAPM

The CAPM is greatly appealing at an intellectual level, logical and rational. The basic assumptions on which the model is built raise, some doubts in the minds of the investors. Yet, investment analysts have been more creative in adapting CAPM for their uses.

- The CAPM focuses on the market risk, makes the investors to think about the riskiness of the assets in general. CAPM provides basic concepts which is truly of fundamental value.
- The CAPM has been useful in the selection of securities and portfolios. Securities with higher returns are considered to be undervalued and attractive for buy. The below normal expected return yielding securities are considered to be overvalued and suitable for sale.
- In the CAPM, it has been assumed that investors consider only the market risk. Given the estimate of the risk free rate, the beta of the firm, stock and the required market rate of return, one can find out the expected returns for a firm's security. This expected return can be used as an estimate of the cost of retained earnings.

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- Even though CAPM has been regarded as a useful tool to financial analysts, it has its own critics too. They point out, when the model is ex-ante, the inputs also should be ex-ante, i.e. based on the expectations of the future. Empirical tests and analyses have used ex-post i.e. past data only.
- The historical data regarding the market return, risk free rate of return and betas vary differently for different periods. The various methods used to estimate these inputs also affect the beta value. Since the inputs cannot be estimated precisely, the expected return found out through the CAPM model is also subjected to criticisms.

5.2.7 Arbitrage Pricing Theory (APT)

Arbitrage pricing theory is one of the tools used by the investors and portfolio managers. The capital asset pricing theory explains the returns of the securities on the basis of their respective betas. According to the previous models, the investor chooses the investment on the basis of expected return and variance. The alternative model developed in asset pricing by Stephen Ross is known as Arbitrage Pricing Theory. The APT theory explains the nature of equilibrium in the asset pricing in a less complicated manner with fewer assumptions compared to CAPM.



Arbitrage: A process of earning profit by taking advantage of differential pricing for the same asset

Arbitrage is a process of earning profit by taking advantage of differential pricing for the same asset. The process generates riskless profit. In the security market, it is of selling security at a high price and the simultaneous purchase of the same security at a relatively lower price. Since the profit earned through arbitrage is riskless, the investors have the incentive to undertake this whenever an opportunity arises. In general, some investors indulge more in this type of activities than others. However, the buying and selling activities of the arbitrageur reduces and eliminates the profit margin, bringing the market price to the equilibrium level.

The assumptions

- The investors have homogenous expectations.
- The investors are risk averse and utility maximisers.
- Perfect competition prevails in the market and there is no transaction cost.

The APT theory does not assume (1) single period investment horizon, (2) no taxes, (3) investors can borrow and lend at risk free rate of interest and (4) the selection of the portfolio is based on the mean and variance analysis. This assumptions are present in the CAPM theory.

Arbitrage portfolio

According to the APT theory an investor tries to find out the possibility to increase returns from his portfolio without increasing the funds in the portfolio. He also likes to keep the risk at the same level. For example, the investor holds A, B and C securities and he wants to change the proportion of the securities without any additional financial commitment. Now the change in proportion of securities can be denoted by X_A, X_B, and X_C. The increase in the investment in security A could be carried out only if he reduces the proportion of investment either in B or C because it has already stated that the investor tries to earn more income without increasing his financial commitment.

NOTES

Thus, the changes in different securities will add up to zero. This is the basic requirement of an arbitrage portfolio. If X indicates the change in proportion,

$$\Delta X_A + \Delta X_B + \Delta X_C = 0.$$

The factor sensitivity indicates the responsiveness of a security's return to a particular factor. The sensitiveness of the securities to any factor is the weighted average of the sensitivities of the securities, weights being the changes made in the proportion. For example b_A, b_B and b_C are the sensitivities, in an arbitrage portfolio the sensitivities become zero.

$$b_A \Delta X_A + b_B \Delta X_B + b_C \Delta X_C = 0$$

The investor holds the A, B and C stocks with the following returns and sensitivity to changes in the industrial production. The total amount invested is ₹1,50,000.

***Table 5.3** Returns and Sensitivity to Change in Industrial Production*

1	R	b	Original weights
Stock A	20%	.45	.33
Stock B	15%	1.35	.33
Stock C	12%	.55	.34

Now the proportions are changed.

The changes are

$$\Delta X_A = .2$$
$$\Delta X_B = .025$$
$$\Delta X_C = -.225$$

For an arbitrage portfolio

$$\Delta X_A + \Delta X_B + \Delta X_C = 0$$
$$.2 + .025 - .225 = 0$$

The sensitivities also become zero

$$\Delta X_A b_A + \Delta X_B b_B + \Delta X_C b_C = 0$$
$$.2 \text{ x } .45 + .025 \times 1.35 - .225 \times .55 = 0$$

In an arbitrage portfolio, the expected return should be greater than zero.

$$\Delta X_A R_A + \Delta X_B R_B + \Delta X_C R_C > 0$$
$$.2 \text{ x } 20 + .025 \times 15 - .225 \times 12$$
$$4.375 - 2.7 > 0$$
$$\text{i.e. } 1.675\%$$

The investor would increase his investment in stock A and B by selling C. The new composition of weights are

$$X_A = 0.53$$
$$X_B = 0.355$$
$$X_C = 0.115$$

The portfolio allocation on stocks A, B and C is as follows

$$= 1{,}50{,}000 \times .53 + 1{,}50{,}000 \times .355 + 1{,}50{,}000 \times .115$$
$$= ₹79{,}500 + 53250 + 17250$$

NOTES

The sensitivity of the new portfolio will be

$= .45 \times .53 + 1.35 \times .355 + .55 \times .115$

$= .239 + .479 + .063$

$= .781$

This is same as the old portfolio sensitivity

i.e. $.45 \times .33 + 1.35 \times .33 + .55 \times .34 = .781$

The return of the new portfolio is higher than the old portfolio.

Old portfolio return

$= 20 \times .33 + 15 \times .33 + 12 \times .34$

$= 6.6 + 4.95 + 4.08$

$= 15.63\%$

The new portfolio return

$= 20 \times .53 + 15 \times .355 + 12 \times .115$

$= 10.6 + 5.325 + 1.38$

$= 17.305\%$

This is equivalent to the old portfolio return plus the return that occurred due to the change in portfolio

$= 15.63\% + 1.675\%$

$= 17.305\%$

The variance of the new portfolio's change is only due to the changes in its non-factor risk. Hence, the change in the risk factor is negligible. From the analysis it can be concluded that

1. The return in the arbitrage portfolio is higher than the old portfolio.
2. The arbitrage and old portfolio sensitivity remains the same.
3. The non-factor risk is small enough to be ignored in an arbitrage portfolio.

Effect on price

To buy stock A and B the investor has to sell stock C. The buying pressure on stock A and B would lead to increase in their prices. Conversly selling of stock C will result in fall in the price of the stock C. With the low price there would be rise in the expected return of stock C. For **example**, if the stock "C" at price ₹100 per share have earned 12 percent return, at ₹80 per share the return would be $12/80 \times 100 = 15$ per cent. At the same time, return rates would be declining in stock A and B with the rise in price. This buying and seiling activity will continue until all arbitrage possibilities are eliminated. At this juncture, there exists an approximate linear relationship between expected returns and sensitivities.

The APT model

According to Stephen Ross, returns of the securities are influenced by a number of macro economic factors. The macro economic factors are growth rate of industrial production, rate of inflation, spread between long term and short term interest rates and spread between low-grade and high grade bonds. The arbitrage theory is represented by the equation:

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$$R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2} \ldots\ldots + \lambda_j b_{ij}$$

R_i = average expected return

λ_1 = sensitivity of return to bi_1

b_{i1} = the beta coefficient relevant to the particular factor

The equation is derived from the model

$$R_i = \alpha_1 + b_{i1} I_1 + b_{i2} I_2 \ldots\ldots\ldots + b_{ij} I_j + e_i$$

Let us take the two factor model

$$R_i = \lambda_0 + \lambda_1 b_{i2} + b_{i2}$$

If the portfolio is a well diversified one, unsystematic risk tends to be zero and systematic risk is represented by b_{i1} and b_{i2} in the equation.

Let us assume the existence of three well diversified portfolios as shown in the table.

Portfolio	Expected return	b_{i2}	b_{i2}
A	12.0	1	0.5
B	13.4	3	0.2
C	12	3	–0.5

The equation $R_i = \lambda_0 + \lambda_1 b_{i1} + \lambda_2 b_{i2}$ can be determined with the help of the above mentioned details. By solving the following equations

$$12 = \lambda_0 + 1\lambda_1 + 0.5\,\lambda_2$$

$$13.4 = \lambda_0 + 3\lambda_1 + 0.2\lambda_2$$

$$12 = \lambda_0 + 3\lambda_1 - .5\lambda_2$$

we can get

$$R_i = 10 + 1b_{i1} + 2\,b_{i2}$$

The expected return is

$$R_p = \sum_{i=1}^{N} X_i R_i$$

The risk is indicated by the sensitivities of the factors

$$b_{p1} = \sum_{i=1}^{N} X_i b_{i1};\; b_{p2} = \sum_{i=1}^{N} X_i b_{i2}$$

All the portfolios constructed from portfolios A, B and C lie on the plane described A, B and C. Assume there exists a portfolio D with an expected return 14 per cent, b_{i1} = 2.3 and b_{i2} = .066. This portfolio can be compared with the portfolio E having equal portion of A, B and C portfolios. Every portfolio would have a share of 33 per cent. The portfolio b_{pj} are

$$b_{P1} = 1/3 \times 1 + 1/3 \times 3 + 1/3 \times 3 = 2.33$$

$$b_{P2} = 0.5 \times 1/3 + 0.2 \times 1/3 + (-0.5 \times 1/3) = 0.066$$

The risk for portfolio E is identical to the risk on portfolio D. The expected return for portfolio E is

$$1/3\,(12) + 1/3\,(13.4) + 1/3\,(12)$$
$$= 12.46$$

Since the portfolio E lies on the plane described above, the return could be obtained from the equation of the plane.

$$R = 10 + 1\,(2.33) + 2\,(.066)$$
$$= 12.46$$

The portfolio D and E have the same risk but different returns. In this juncture, the arbitrageur enters in and buy portfolio D by selling portfolio E short. Thus buying of portfolio D through the funds generated from selling E would provide riskless profit with no investment and no risk. Let us assume that the investor sells ₹1000 worth of portfolio E and buys ₹1000 worth of portfolio D. The cash flow is as shown in the following table.

	Initial cash flow	End of period	b_{i1}	b_{i2}
Portfolio D	– ₹1000	+ 1140.0	+2.33	+.06
Portfolio E	+ ₹1000	– 1124.6	–2.33	–.06
Arbitrage portfolio	0	15.4	0	0

The arbitrage portfolio involves zero investment, has no systematic risk (bi_1 and bi_2) and earns ₹15.4. Arbitrage would continue until portfolio D lies on the same plane.

Arbitrage pricing equation

In a single factor model, the linear relationship between the return R_i and sensitivity b_i can be given in the following form.

$$R_i = \lambda_O + \lambda_i\, b_i$$

R_i = return from stock A

λ_o = riskless rate of return

b_i = the sensitivity related to the factor

λ_i = slope of the arbitrage pricing line

The above model is known as single factor model since only one factor is considered. Here, the industrial production alone is considered. The APT one factor model is given in Figure 5.6.

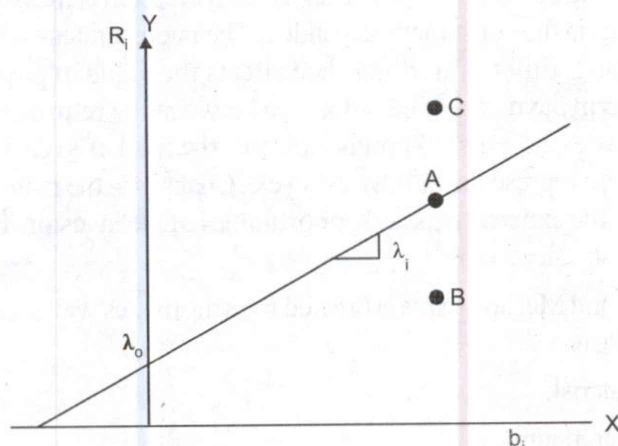


Fig. 5.6 APT One Factor Model

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The risk is measured along the horizontal axis and the return on the vertical axis. The A, B and C stocks are considered to be in the same risk class. The arbitrage pricing line intersects the Y axis on λ_o, which represents riskless rate of interest i.e. the interest offered for the treasury bills. Here, the investments involve zero risk and it is appealing to the investors who are highly risk averse. λ_i stands for the slope of arbitrage pricing line. It indicates market price of risk and measures the risk-return trade off in the security markets. The β_i is the sensitivity coefficient or factor beta that shows the sensitivity of the asset or stock A to the respective risk factor.

The constants of the APT equation

The existence of the risk free asset yields a risk free rate of return that is a constant. The asset does not have sensitivity to the factor for example, the industrial production.

If

$$b_i = 0$$
$$R_i = \lambda_o + \lambda_i 0$$
$$R_i = \lambda_o$$
$$R_i = \lambda_o$$

In other words, λ_o is equal to the risk free rate of return. If the single factor portfolio's sensitivity is equal to one i.e. $b_i = 1$ then

$$R_i = \lambda_o + \lambda_i 1$$

This can be rewritten as

$$R_i = \lambda_o + \lambda_i$$
$$R_i - \lambda_o = \lambda_i$$

Thus, λ_i is the expected excess return over the risk free rate of return for a portfolio with a unit sensitivity to the factor. The excess return is known as risk premium.

Factors affecting the return

The specification of the factors is carried out by many financial analysts. Chen, Roll and Ross have taken four macro economic variables and tested them. According to them the factors are inflation, the term structure of interest rates, risk premia and industrial production. Inflation affects the discount rate or the required rate of return and the size of the future cash flows. The short term inflation is measured by monthly percentage changes in the consumer price index. The interest rates on long term bonds and short term bonds differ. This difference affects the value of payments in future relative to short term payments. The difference between the return on the high grade bonds and low grade (more risky) bonds indicates the market's reaction to risk. The industrial production represents the business cycle. Changes in the industrial production have an impact on the expectations and opportunities of the investor. The real value of the cash flow is also affected by it.

Burmeister and McElroy have estimated the sensitivities with some other factors. They are given below

- Default risk
- Time premium
- Deflation

- Change in expected sales
- The market return not due to the first four variables.

The default risk is measured by the difference between the return on long term government bonds and the return on long term bonds issued by corporate plus one-half of one per cent. Time premium is measured by the return on long term government bonds minus one month treasury bill rate one month ahead. Deflation is measured by expected inflation at the beginning of the month minus actual inflation during the month. According to them, the first four factors accounted 25 per cent of the variation in the Standard & Poor's Composite Index and all the four coefficients were significant.

Salomon Brothers identified five factors in their fundamental factor model. Inflation is the only common factor identified by others. The other factors are given below.

- Growth rate in gross national product
- Rate of interest
- Rate of change in oil prices
- Rate of change in defence spending

All the three sets of factors have some common characteristics. They all affect the macro economic activities. Inflation and interest rate are identified as common factors. Thus, the stock price is related to aggregate economic activity and the discount rate of future cash flow.

APT and CAPM : A comparison

The simplest form of APT model is consistent with the simple form of the CAPM model. When only one factor is taken into consideration, the APT can be stated as:

$$R_i = \lambda_O + b_i\lambda_i$$

It is similar to the capital market line equation

$$R_i = R_f + \beta_i (R_m - R_f)$$

which is similar to the CAPM model.

APT is more general and less restrictive than CAPM. In APT, the investor has no need to hold the market portfolio because it does not make use of the market portfolio concept. The portfolios are constructed on the basis of the factors to eliminate arbitrage profits. APT is based on the law of one price to hold for all possible portfolio combinations.

The APT model takes into account the impact of numerous factors on the security. The macro economic factors are taken into consideration and it is closer to reality than CAPM.

The market portfolio is well defined conceptually. In APT model, factors are not well specified. Hence the investor finds it difficult to establish equilibrium relationship. The well-defined market portfolio is a significant advantage of the CAPM leading to the wide usage of the model in the stock market.

The factors that have impact on one group of securities may not affect another group of securities. There is a lack of consistency in the measurements of the APT model.

Further, the influences of the factors are not independent of each other. It may be difficult to identify the influence that corresponds exactly to each factor. Apart from this, not all variables that exert influence on a factor are measurable.

NOTES



Market efficiency: The accuracy and the quickness in which the market translates the expectation into prices are termed as market efficiency



Informational efficiency: It is a measure of the swiftness or the market's reaction to new information

Check Your Progress

1. When and where was Harry Markowitz born?
2. Who provided the Capital Asset Pricing Model (CAPM) theory?
3. How is risk-return relationship of an efficient portfolio measured?

5.3 EFFICIENT MARKET HYPOTHESES

Before understanding the efficient market theory, certain concepts and phrases, such as market efficiency, liquidity traders and information traders, should be understood.

Market efficiency

The expectations of the investors regarding the future cashflows are translated or reflected on the share prices. The accuracy and the quickness in which the market translates the expectation into prices are termed as **market efficiency**. There are two types of market efficiencies:

- **Operational efficiency:** At the stock exchange, operational efficiency is measured by factors like time taken to execute the order and the number of bad deliveries. Investors are concerned with the operational efficiency of the market. But efficient market hypothesis does not deal with this efficiency.
- **Informational efficiency:** It is a measure of the swiftness or the market's reaction to new information. New information in the form of economic reports, company analysis, political statements and announcement of new industrial policy is received by the market frequently. How does the market react to this? Security prices adjust themselves very rapidly and accurately. They never take a long time to adjust to the new information. For **example**, the announcement of bonus shares of any company would result in a hike in price of that stock. Similarly, major changes in the policy decisions of the government are also reflected in the stock index movement.

Liquidity traders

Investments and resale of shares by liquidity traders depend upon their individual fortune. Liquidity traders may sell their shares to pay their bills. They do not investigate before they invest.

Information traders

Information traders analyse before adopting any buy or sell strategy. They estimate the intrinsic value of shares. The deviation between the intrinsic value and the market value makes them enter the market. They sell if the market value is higher than the intrinsic value and vice versa. The buying and selling of the shares through the demand and supply forces bring the market price back to its intrinsic value.

Three versions of efficient market hypothesis

In 1900, a French mathematician named Louis Bachelier wrote a paper suggesting that security price fluctuations were random. In 1953, Maurice Kendall in his paper reported that stock price series is a wandering one. They appeared to be random, each successive change being independent of the previous one. In 1970, Prof. Eugene Fama at the University of Chicago Booth School of Business stated that efficient

markets fully reflect the available information. If markets are efficient, securities' prices reflect normal returns for their level of risk. Fama suggested that efficient market hypothesis can be divided into three versions. They are 'weak form', the 'semi-strong form' and the 'strong form'. The level of information being considered in the market is the basis for this segregation. Figure 5.7 shows the market efficiency level.

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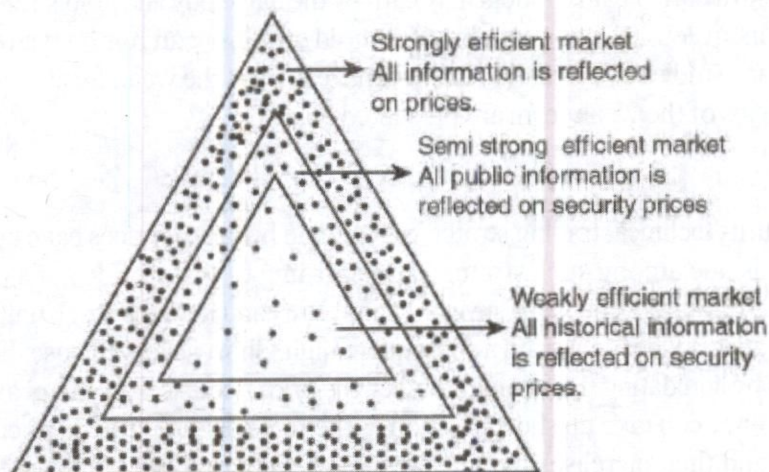


Fig. 5.7 Levels of Information and the Markets

5.3.1 Weak Form of EMH (Random Walk Theory)

The **random walk theory** states that market and securities prices are random; they are not influenced by past events. The idea is also called the, weak form efficient market hypothesis. The term 'random walk' was coined by Prof. Burton G. Malkiel in his book *A Random Walk Down Wall Street.* The type of information used in the weak form of EMH is the historical prices. According to it, current prices reflect all information found in the past prices and traded volumes. Future prices can not be predicted by analysing the prices from the past. Everyone has the access to the past prices, even though some people can get these more conveniently than others. Liquidity traders may sell their stocks with out considering the intrinsic value of the shares and cause price fluctuations. Buying and selling activities of the information traders lead the market price to align with the intrinsic value.



Random walk theory: The random walk theory states that market and securities prices are random; they are not influenced by past events

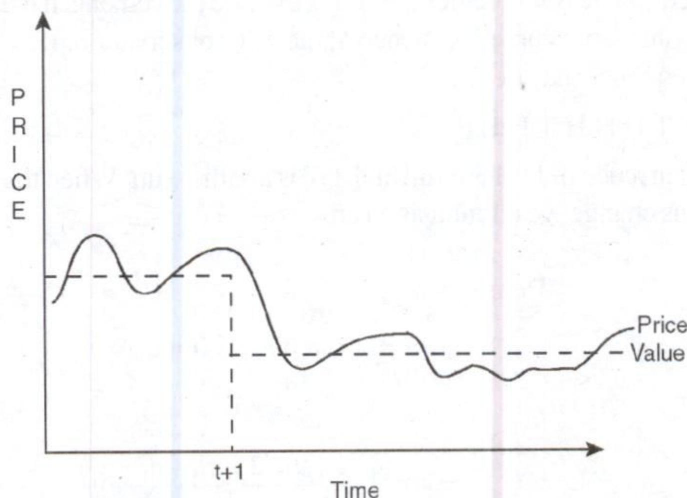


Fig. 5.8 Weakly Efficient Market

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Filter rule: A price of a security rises by atleast x per cent, investor should buy and hold the stock until its price declines by atleast x per cent from a subsequent high

The dotted line represents the intrinsic value. The intrinsic value changes at times, t and t + 1. In the weak form of market the price of the stock and its intrinsic value diverges substantially.

In the weak efficient market, short term traders may earn a positive return. On an average, short term traders will not out perform the blind folded investor picking the stock with a dart. That is traders may earn by the naive buy and hold strategy while some may incur loss, the average buy and hold strategy can not be beaten by the chartist. Many studies of the market analysts have proved the weak form of the EMH. Empirical tests of the weak form are presented here.

Filter rule

To earn returns technical trading strategies based on historical prices have been used. **Filter rule** is one among such strategies. According to this strategy, if a price of a security rises by atleast x per cent, investor should buy and hold the stock until its price declines by atleast x per cent from a subsequent high. Short sellers can use the filter to earn profits by liquidating their holdings when the price decreases from a peak level by x per cent. They can take up short position as the price declines till the price reaches a new low and then increases by 'x' percentage. Different filter rules are used by different traders. It ranges from as small as .5 per cent to as large as 50 per cent.

Example:

The filter rule can be explained with the help of an example. Take a hypothetical company XY and assume the filter to be 10 per cent. The price fluctuates between ₹ 20 to 30. Assume the starting point to be ₹ 20. When there is an increase in the price of the share to ₹ 22 i.e., (10 per cent rise) one has to buy it. The rally may continue up to ₹ 30 and decline. If the price falls the sell signal is given at ₹ 27 i.e. 10% of ₹ 30 and the trader can take up the short position till it reaches its low level. When there is a rise in price the same exercises have to be followed.

Several studies have found that after commissions the average gains produced by the filter rules were much below normal than the gains of the simple buy and hold strategy adopted by the investor.

Runs test

Runs test is used to find out whether the series of price movements have occurred by chance. A run is an uninterrupted sequence of the same observation. If a coin is tossed, the following sequence may occur.

H H T T T H H H T H H

Here occurrence of H H is a run and T T is another run. When the sequence of the observations change we count it as a run.

$$\text{Runs Test } Z = \frac{R - \overline{X}}{\sigma}$$

$$R = \text{number of runs}$$

$$\overline{X} = \frac{2_{n1}\ n_2}{n_1 + n_2} + 1$$

$$\sigma^2 = \frac{2_{n1}\ n_2(2_{n1}\ n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}$$

$n_1 + n_2$ = number of observations in each category

σ = standard deviation

Z = standard normal variate

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Example

The following example is used to explain the calculation of runs test. Reliance Petroleum stock prices are given along with their runs in the Table 5.4.

$$\text{Runs Test } Z = \frac{R - \overline{X}}{\sigma}$$

$$R = \text{number of runs}$$

$$\overline{X} = \frac{2_{n1}\ n_2}{n_1 + n_2} + 1$$

$$\overline{X} = \frac{2 \times 19 \times 15}{34} + 1 = 17.76$$

$$\sigma^2 = \frac{2_{n1}\ n_2(2_{n1}\ n_2 - n_1 - n_2)}{(n_1 + n_2)^2 (n_1 + n_2 - 1)}$$

$$\sigma^2 = \frac{2 \times 19 \times 15[(2 \times 19 \times 15) - 19 - 15]}{(19 + 15)^2\ (19 + 15 - 1)} = 8.01$$

$$\sigma = 2.83$$

$$= \frac{16 - 17.6}{2.83} = -0.565$$

Table 5.4 *Reliance Petroleum Stock Prices*

Date	***Price***	***Runs***	***Date***	***Price***	***Runs***
Sep'20	43.05		Oct'19	54.70	+
21	43.40	+1	20	58.95	+11
22	41.75	− 2	21	60.30	
23	42.65	+3	25	59.65	
24	43.60		26	58.65	
28	43.05	− 4	27	56.80	
29	43.40	+5	28	53.50	–12
Sep'1	46.80		29	51.50	
4	46.60	− 6	Nov'1	48.40	
5	47.50	+7	2	52.30	+13
6	47.40	− 8	3	56.05	
7	52.15		4	55.15	–14
8	52.50	+9	5	56.40	
11	53.45		7	57.15	
12	57.55		9	57.25	+15
13	57.45		10	57.55	
14	55.90	–10	11	56.75	–16
15	54.15				

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The consecutive rise in prices would be counted as a positive run and the decline would be counted as a negative run.

According to the probability theory, 95 per cent of the area under the normal curve lies within ±1.96 standard deviation of the mean. Since the calculated value –0.565 is less than –1.96, the runs have occurred by chance.

Published results of the studies using runs test have suggested that the runs in the price series of stocks are not significantly different from the runs in the series of random numbers.

Serial correlation

To test the independence between successive price changes, serial correlation technique is used. Serial correlation or auto-correlation measures the correlation coefficient in a series of numbers with the lagging values of the same series. Price changes in period t + 1 (or t + any number) are correlated with the price changes of the preceding period. Scatter diagrams can be used to find out the correlation. If there is correlation between the price of t and t + 1 period, the points plotted in the graph would form a straight line. If the price rise (or fall) in period t is followed by price rise (or fall) in period t + 1 then the correlation coefficient would be +1. But many studies conducted on the security price changes have failed to show any significant correlations. Fama computed serial correlations for 30 stocks for the period 1958–62 with varying t periods from t + 1 to t + 10. The results of the autocorrelations were generally found to be insignificant, with most falling with in the range of +. 10 to –. 10. If there is little correlation between stock price over time, chart analyses cannot be of much use in predicting the future.



Semi-strong form: The semi-strong form of the efficient market hypothesis states that the security price adjusts rapidly to all publicly available information

5.3.2 Semi-Strong Market Form

The **semi-strong form** of the efficient market hypothesis states that the security price adjusts rapidly to all publicly available information. In the semi-strong efficient markets, security prices fully reflect all publicly available information. The prices not only reflect the past price data, but also the available information regarding the earnings of the corporate, dividend, bonus issue, right issue, mergers, acquisitions and so on. In the semi-strongly efficient market a few insiders can earn a profit on a short run price changes rather than the investors who adopt the naive buy and hold policy.

In the case of a competitive market, price is fixed by the supply and demand force. The price at the equilibrium level of the supply and demand represents the consensus opinion of the market. The intrinsic value of the stock and the equilibrium price are the same. Whenever a new information arrives at the market, the supply and the demand factors react to it. If the market processes the new information quickly, a new price would come out of it. If the market has to be semi-strongly efficient, timely and correct dissemination of information and assimilation of news are needed. Only then, the market can reflect all the relevant information quickly. It is stated that the stock markets in US strongly supports the semi-strong hypothesis because the prices adjust rapidly to the new information.

Empirical evidence

Fama, Fisher, Jensen and Roll were the forerunners in examining the semi-strong form of EMH. They analysed the effect of stock split on share prices. Their study was important because (a) it provided evidence to semi-strong form of market (b) it analysed

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whether the stock splits increase the wealth of the shareholders and (c) they developed a research method to test the market efficiency.

The authors have developed a method to compute abnormal returns by using the simple regression technique. To estimate the normal return, the security returns were regressed against the return of the stock market index. The equation is given below:

$$r_{it} = \alpha_1 + \beta_1 r_{mt} + e_{it}$$

where r_{it} = realized return for the i the stock in the time period t

r_{mt} = realized return for index in time period t

$\alpha_{1,}$ $\beta_{1=}$ regression coefficients

e_{it} = error term, or residual for the time period t

The normal return for any time period is assumed to be as follows :

Normal return = $\alpha_1 + \beta_1 r_{mt}$

Here e_{it} is assumed to indicate the abnormal return.

For any particular time period AR_{it} is

$$e_{it} = r_{it} - (\alpha_1 + \beta_1 r_{mt})$$

$$e_{it} = AR_{it}$$

AR_{it} is abnormal return

This method of estimating the abnormal return is frequently referred to as the residual analysis. The regression equation represents normal returns and e_{it} represents abnormal returns.

The average of abnormal return can be obtained by adding the abnormal returns over time and dividing it by *n*. The AAR can be measured around a date of event or the announcement date of stock split or bonus issue.

$$AAR_t = \frac{1}{n}\sum_{i=1}^{N} AR_{it}$$

CAAR = Σ AAR. The CAAR (Cumulative Average Abnormal Return) is computed by adding the AAR_{it} for each period. Period generally begins several weeks before the event and ends several weeks after the event. The cumulative average of abnormal return provides a picture of average price behaviour of securities over time. If the markets are efficient, the CAAR should be close to zero.

The authors have reviewed hundreds of cases of efficient corporations and dissimilar sample periods to study the effect of the stock splits. They have examined 940 stock splits from 1927–1959 in the New York Stock Exchange. The price behaviour is analysed 29 months prior and after the date of the stock split. They found out the CAAR for all the 940 observations. They found out the level of CAAR very insignificant and essentially fall from the date of split announcement. According to them the simple strategy of buying shares after a stock split would not appear to produce abnormal returns. The study results of the authors provide evidence for the semi-strong form of EMH.

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Market ability to absorb the reported annual earning per share was analysed by Ball and Brown. Their study has shown that the actual good price earnings were higher than the predicted good price earnings and at the same time the low price earnings were lower than the predicted low price earnings. Ball and Brown have found out that even before the announcement of the good report, the respective shares experienced a rise in price. Likewise, even before the announcement of the negative earning report, the share prices decreased. Both the groups generated only normal returns after the announcement providing support for semi-strong form.

Scholes in his study had found out that the market is efficient enough to identify the type of seller too. He analysed the price effects of large secondary offerings. Generally, price tends to decline before the secondary offering. This is mainly due to the information effect not due to the selling pressure. If the large selling is associated with the corporate members and officers, the prices tend to decline at a faster rate. But if it is sold by some other groups who are not considered under this, then decline in price is small.



Strong form EMH: The strong form EMH states that all information is fully reflected on security prices

5.3.3 Strongly Efficient Market Forms

The **strong form EMH** states that all information is fully reflected on security prices. It represents an extreme hypothesis which most observers do not expect it to be literally true. The strong form of the efficient market hypothesis maintains all information is useless because the market price would have already incorporated them fully. Information whether it is public or inside cannot be used consistently to earn superior investors' return in the strong form. This implies that security analysts and portfolio managers who have access to information more quickly than the ordinary investors would not be able to use it to earn more profits.

Empirical evidence

Many of the tests of the strong form of the efficient market hypothesis deal with mutual fund performances. Financial analysts have studied the risk adjusted rates of return from hundreds of mutual funds and found out that the professionally managed funds are not able to out perform the naive -buy - hold strategy. Jensen had studied 115 funds over a decade. He concluded that even though the analysts are well endowed with wide ranging contacts and associations in both the business and financial committees, they are unable to forecast returns accurately enough to recover the research and transaction costs. He holds this, as a striking piece of evidence for the strong form of the efficient market hypothesis.

The essence of the theory

According to the theory, the successive price changes or changes in return are independent and these successive price changes are randomly distributed. Random Walk Model argues that all publicly available information is fully reflected on the stock prices and further the stock prices instantaneously adjust themselves to the available new information. The theory mainly deals with the successive changes rather than the price or return levels.

According to them, the market may have imperfections like transaction cost and delays in disseminating relevant information to all market investors but these sources

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of inefficiency may not result in excess returns above the normal or equilibrium returns. The equilibrium return is defined as the return earned by naive buy and hold strategy.

The investors should note that the random theory says nothing about the relative price changes that is the changes that are occurring across the securities. Some securities may out perform others. Again, it does not make any remark on the decomposing of price into market, industry or firm factors. All these factors are concerned with the relative prices but not with the absolute price changes. The random walk hypothesis deals with the absolute price changes and not with the relative prices.

The prices may move at random but this does not indicate that there would not be any upward or downward movement in the price. The random walk hypothesis is entirely consistent with the upward and downward movements of the stock prices.

Market inefficiencies

Many studies have proved the prevalence of the market efficiency. At the same time, several study results contradict the concept of market efficiency. For example, the studies conducted by Joy, Litzenberger and Mc.Enally over the period of 1963-1968 gave different results. The authors have examined the quarterly earnings of the stock prices. The earning of one quarter was compared with the same quarter of the previous year. If the current year's earnings were 40 per cent or more higher than the earnings for the same quarter in the previous year, the earnings were classified as good earnings than anticipated. If the current quarter's earnings were below 40 per cent of the previous year's earnings, they are classified as worse than expected.

Then the abnormal returns were calculated from 13 weeks prior to the announcement of the earnings to 26 weeks after the announcement of the earnings. The stocks whose earnings are substantially greater than anticipated gave positive abnormal returns. The stocks whose earnings are below the anticipated earnings generated negative abnormal returns.

The authors main claim is that after the announcement of the earnings, stocks that reported earnings substantially above those of the previous year continued to earn positive abnormal returns. According to the study, the investors could have earned positive abnormal returns of around 6.5 per cent over the next 26 weeks simply by buying stocks that have reported earnings 40 per cent above the previous quarterly earnings. Meanwhile, for those stocks with earnings substantially below the previous year, the cumulative average abnormal return remained relatively stable. This shows evidence against the semi-strong market hypothesis because it states that when the information is made public the analyst could not earn abnormal profits. A study made by C.P. Jones, R.S. Rendleman for the period 1971–1980 had also given similar results to those of JLM.

Low price-earnings (PE) effect

Many studies have provided evidences that stocks with low price earnings ratios yield higher returns than stocks with higher PEs. This is known as low PE effect. A study made by Basu in 1977 was risk adjusted return and even after the adjustment there was excess return in the low price-earnings stocks. If historical information of P/E ratios is useful to the investor in obtaining superior stock returns, the validity of the semi-strong form of market hypothesis is questioned. His results stated that low P/E

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portfolio experienced superior returns relative to the market and high P/E portfolio performed in an inferior manner relative to the overall market. Since his result directly contradicts semi-strong form of efficient market hypothesis, it is considered to be important.

Small firm effect

The theory of the small firm effect maintains that investing in small firms (those with low capitalization) provides superior risk adjusted returns. Banz found that the size of the firm has been highly correlated with returns. Banz examined historical monthly returns of NYSE common stocks for the period 1931–1975. He formed portfolios consisting of 10 smallest firms and the 10 largest firms and computed the average return for these portfolios. The small firm portfolio has out performed the large firm portfolio.

Several other studies have confirmed the existence of a small firm effect. The size effect have given rise to the doubts regarding the risk associated with small firms. The risk associated with them are underestimated and they do not trade as frequently as the those of the large firms. Correct measurement of risk and return of small portfolios tends to eliminate at least 50 per cent of the small firm effect.

The weekend effect

Louis Bachelier in his study had examined the returns generated by the Standard and Poor Index for each day of the week. Stock prices tend to rise all week long to a peak on Fridays. The stocks are traded on Monday at reduced prices, before they begin the next week's price rise. Buying on Monday and selling on Friday from 1953 to 1977 would have generated average annual return of 13.4 per cent while simple buy and hold would have yielded 5.5 per cent annual return. If the transaction costs are taken into account, the naive buy and hold strategy would have provided higher return. Yet the knowledge of the weekend effect is still of value. Purchases planned on Thursday or Friday can be delayed until Monday, while sale planned for Monday can be delayed until the end of the week. The weekend effect is a small but significant deviation from perfectly random price movements and violates the weekly efficient market hypothesis.

Similar to this, Venkatesh B. of the B.L. Research Bureau has stated that the Bombay Stock Exchange reveals a discernible pattern. Usually, Monday, is characterized by trading blues, and Friday by frenzied activity. The Friday rush is more to do with speculators covering their open position. If the short sellers fail to cover their position within this period, their open positions are called to auction where prices are dear.

5.4 SUMMARY

Some of the important concepts discussed in this unit are:

- The CAPM model is based on specific assumptions. The investor could borrow or lend any amount of money at riskless rate of interest.
- All investors hold only the market portfolio and the riskless securities.

Check Your Progress

4. Name the concepts related with the efficient market theory.
5. Why is the Runs test used?
6. What is CAAR?

- Market portfolio consists of the investments in all securities of the market. The proportion invested in each security is equal to the percentage of the total market capitalisation represented by the security.
- The capital market line represents the relationship between the expected return and standard deviation of the portfolio.
- The risk of the security is indicated by its covariance with the market portfolio.
- Security market line shows the linear relationship between the expected returns and betas of the securities.
- The objective of the asset pricing model is to identify the equilibrium asset price for expected return and risk. If the asset prices are not equal, there is a scope for arbitrage.
- An arbitrage portfolio is constructed without any additional financial commitment.
- Investors indulge in arbitrage, moving the price upwards if securities are held long and driving down the price of securities if held in short position, till the elimination of the arbitrage possibilities.
- The factor sensitivity in arbitrage model indicates the responsiveness of a security's return to a particular factor.
- The market efficiency is the accuracy and the quickness in which the price reflects the market related information.
- In the weak form of market, current prices reflect all the information found in the past prices and traded volumes. Filter rule, runs test and serial correlation are adopted to find out the market efficiency.
- In the semi-strong form of market, all the publicly available information is reflected by the security prices.
- In the strong form of market, all the information is fully reflected by the stock prices.
- The low P/E effect, small firm effect, and weekend effect are cited as some of the inefficiencies of the market.

5.5 ANSWERS TO 'CHECK YOUR PROGRESS'

1. Harry Markowitz was born on August 24^{th} 1927 in Chicago.
2. The Capital Asset Pricing Model (CAPM) theory was provided by Harry Markowitz, John Lintner and Jan Mossin.
3. The risk-return relationship of an efficient portfolio is measured by the capital market line.
4. The concepts related with the efficient market theory are: Market efficiency, liquidity traders and information traders.
5. The Runs test is used to find out whether the series of price movements have occurred by chance.
6. CAAR is the abbreviated form of Cumulative Average Abnormal Return. It is computed by adding the average abnormal return for each period.

5.6 QUESTIONS AND EXERCISES

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Short-Answer Questions

1. Who propounded the theory of Capital Asset Pricing Model (CAPM)?
2. Define the Arbitrage Pricing Theory (APT).
3. What are the concepts associated with the efficient market theory?
4. What do you understand by Random Walk Theory?
5. What is the use of Runs test?

Long-Answer Questions

1. Critically explain the theory of Capital Asset Pricing Model (CAPM).
2. What are the assumptions of CAPM theory?
3. Explain the Arbitrage Pricing Theory (APT).
4. Give a comparative description of APT and CAPM.
5. What do you understand by market inefficiency? Elucidate.

UNIT 6 PORTFOLIO PERFORMANCE

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Structure

6.0 INTRODUCTION

In simple terms, portfolio evaluation can be defined as the evaluation of the performance of the portfolio. The process of portfolio evaluation can be explained as the comparison of the returns earned on one particular portfolio with the returns earned by another portfolio or a benchmark portfolio. Sometimes comparisons are even made with more than one portfolio. Two basic functions are performed in the process of portfolio evaluation, i.e., performance measurement and performance evaluation. Performance measurement is basically an accounting function which measures the return earned on a particular portfolio during the investment period or the holding period, whereas, performance evaluation looks into different factors of a portfolio which may affect the return. For instance, performance evaluation judges the performance of the portfolio on basis of quality-whether it was superior or inferior, and whether the performance was based on skill or luck. The risk associated with the portfolio has to be kept in mind along with the return earned while evaluating the performance of a portfolio. To compare portfolios, one approach that can be followed is to group the portfolios into an equivalent risk classes and then compare the returns of portfolios within each risk category. An alternative approach to compare portfolios could be by specifically adjusting the return for riskiness of the portfolio by developing risk-adjusted return measures and use these for evaluating portfolios among different risk levels.

A great deal of research has been done on the subject of portfolio evaluation. A method to evaluate portfolios has been suggested by William Sharpe in 1966. Based on the results obtained in portfolio analysis, economist Jack Treynor developed a new predictor of mutual fund performance which differed from virtually all those previously used in which the volatility of a fund's return was incorporated in a simple yet meaningful manner. The first and most important step in portfolio evaluation is to calculate the rate of return earned over the holding period. One important aspect to be kept in mind

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while calculating the return earned is that return may include changes in the value of the portfolio over the holding period and any other income that has been earned over the period.

In this unit, you will also learn about portfolio revision and portfolio audit. The care taken in the construction of the portfolio should be extended to the review and revision of the portfolio. Fluctuations that occur in the equity prices cause substantial gain or loss to the investors. The investor should have competence and skill in the revision of the portfolio. Normally the average investor dislikes to sell in the bull market with the anticipation of further rise. Likewise, he is reluctant to buy in the bear market with the anticipation of further fall.

6.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Understand portfolio risk-return
- Learn about the methods used to measure the portfolio risk-return
- Judge the performance index of Sharpe, Treynor and Jensen
- Develop an idea about portfolio revision
- Evaluate portfolio audit and its objectives

6.2 MEASURING PORTFOLIO RISK-RETURN: SHARPE, TREYNOR AND JENSON METHODS

Portfolio return broadly consists of two components. The first component is the income for the current period which may be in the form of dividend on stocks or interest to be paid on the bonds. The second component of portfolio return is the capital which is presented in the form of gain or loss. This component is calculated when the financial asset is sold. Portfolio return is equivalent to the difference between the selling price of the financial asset and the purchase price of the asset.

$$\text{Portfolio Return} = \frac{\text{Dividends + Interest + Realized Gains or Losses + Unrealized Gains or Losses}}{\text{Initial Investment + (Added Funds} \times \text{Number of months in Portfolio/12)} - \text{(Withdrawn funds} \times \text{Number of Months Withdrawn from Portfolio/12)}}$$

The numerator contains the return components and the denominator has the time for which investment is held. There are several ways of comparing the portfolio returns with each other and with market. The most common methods that are used to measure the portfolio risk-return tradeoff are:

- Sharpe's Ratio
- Treynor's Ratio
- Jensen's Alpha

6.2.1 Sharpe's Performance Index

Sharpe's performance index gives a single value to be used for the performance ranking of various funds or portfolios. **Sharpe index measures** the risk premium of the portfolio relative to the total amount of risk in the portfolio. This risk premium is the difference between the portfolio's average rate of return and the riskless rate of return. Sharpe measure adjusts portfolio performance for the total risk rather than the market risk. Hence, the Sharpe ratio is the measure of the performance of the portfolio compared to the risk taken. Reward is in the numerator as risk premium. Total risk is in the denominator as standard deviation of its return. Measure of portfolio's total risk and variability of returns in relation to the risk premium which is the product of the portfolio manager's expertise is obtained. The standard deviation of the portfolio indicates the risk. The index assigns the highest values to assets that have best risk-adjusted average rate of return.

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Sharpe index measures: The risk premium of the portfolio relative to the total amount of risk in the portfolio

$$S_t = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Sharpe Index} = \frac{\text{Portfolio average return} - \text{Risk free rate of interest}}{\text{Standard deviation of the portfolio return}}$$

The details of two hypothetical funds A and B are given in Table 6.1.

Table 6.1 *Risk and Return for Funds A and B*

Fund	Average Annual Return	Riskless Rate of Interest	Standard Deviation	S_t
A	0.0879	0.05	0.0829	$\frac{0.0879-.05}{.0829}=0.457$
B	0.1347	0.05	0.1982	$\frac{0.1347-.05}{0.1982}=0.427$

The larger the S_t, better the fund has performed. Thus, A ranked as better fund because its index .457 > .427 even though the portfolio B had a higher return of 13.47 per cent. It is shown in Figure 6.1. The reason is that the fund 'B's managers took such a great risk to earn the higher returns and its risk adjusted return was not the most desirable. Sharpe index can be used to rank the desirability of funds or portfolios, but not the individual assets. The individual asset contains its diversifiable risk.

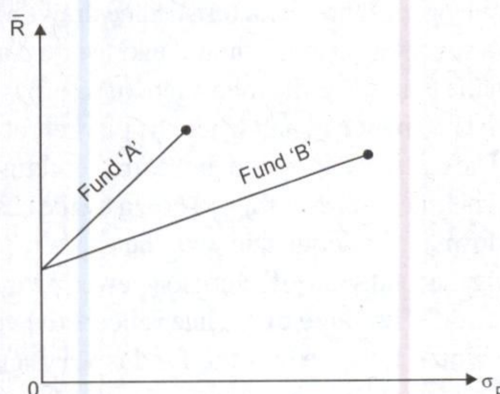


Fig. 6.1 *Risk and Return for Funds 'A' and 'B'*

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6.2.2 Treynor's Performance Index

To understand the Treynor index, an investor should know the concept of characteristic line. The relationship between a given market return and the fund's return is given by the characteristic line. The fund's performance is measured in relation to the market performance. The ideal fund's return rises at a faster rate than the general market performance when the market is moving upwards and its rate of return declines slowly than the market return, in the decline. The ideal fund may place its fund in the treasury bills or short sell the stock during the decline and earn positive return. The relationship between the ideal fund's rate of return and the market's rate of return is given by Figure 6.2.

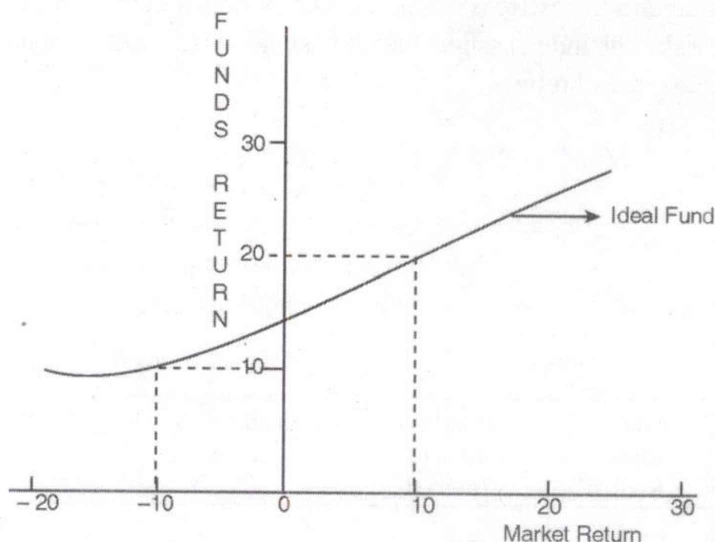


Fig. 6.2 *Fund's Rate of Return*

The market return is given on the horizontal axis and the fund's rate of return on the vertical axis. When the market rate of return increases, the fund's rate of return increases more than proportional and vice versa. In Treynor's model, the ideal fund makes the intersection at 45° angle. The ideal fund is depicted to the left of 45° line. This also above the imaginary 45° line. The return on this line is higher than that which is earned on the market portfolio. Under Treynor's model, if the market portfolio reveals a negative return, the return of the portfolio is positive as is seen in the second quadrant. When the market return is positive, the return under the model of characteristic line is still higher. The characteristic line draws a relationship between the market return and a specific portfolio without taking into consideration any direct adjustment for risk. In the Figure 6.2 the fund's rate of return is 20 per cent when the market's rate of return is 10 per cent, and when the market return is –10, the fund's return is 10 per cent. The relationship between the market return and fund's return is assumed to be linear. This linear relationship is shown by the characteristic line. Each fund establishes a performance relationship with the market. The characteristic line can be drawn by plotting the fund's rate of return for a given period against the market's return for the same period. The slope of the line reflects the volatility of the fund's return. A steep slope would indicate that the fund is very sensitive to the market performance. If the fund is not so sensitive then the slope would be a slope of less inclination.

All the funds have the same slope indicating same level of risk. The investor would prefer A fund, because it offers superior return than funds C and B for the same level of risk exposure. This is shown in Figure 6.3.

With the help of the characteristic line, Treynor measures the performance of the fund. The slope of the line is estimated by

$R_p = a + \beta R_m + e_p$

R_p = Portfolio return

R_m = The market return or index return

e_p = The error term or the residual

α = Risk free rate of return for period 't'

β = Systematic risk measure

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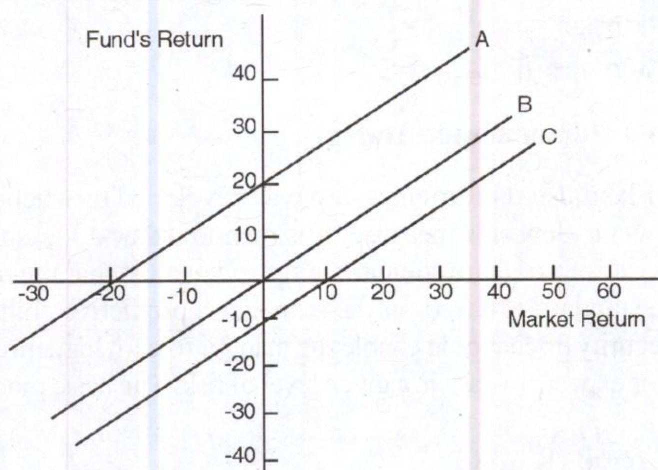


Fig. 6.3 Market Return and Fund's Return

Beta coefficient is treated as a measure of undiversifiable systematic risk.

$$T_n = \frac{\text{Portfolio average return} - \text{riskless rate of interest}}{\text{Beta co- efficient of portfolio}}$$

$$T_n = \frac{R_p - R_f}{\beta_p}$$

Treynor's risk premium of the portfolio is the difference between the average return and the riskless rate of return. The risk premium depends on the systematic risk assumed in a portfolio. Let us analyze two hypothetical funds (Table 6.2 and Figure 6.4).



Treynor's risk premium: Treynor's risk premium of the portfolio is the difference between the average return and the riskless rate of return

Table 6.2 *Funds A and B*

Fund	Average Return	Beta	Risk Premium	R_f	T_n
A	0.0879	0.499	.0379	.05	$\frac{.0879 - .05}{.499} = 0.076$
B	0.1347	1.2493	.0847	.05	$\frac{.1347 - .05}{1.2493} = 0.0678$

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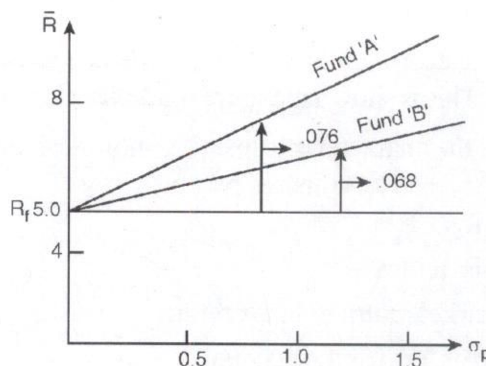


Fig. 6.4 Performance of Funds 'A' and 'B'

The fund 'A' is more desirable than B because it earned more risk premium per unit of systematic risk

i.e T_n of A .076 > .0678 of 'B's.

6.2.3 Jensen's Performance Index

The absolute risk adjusted return measure was developed by Michael Jensen and commonly known as Jensen's measure. It is mentioned as a measure of absolute performance because a definite standard is set and against that the performance is measured. The standard is based on the manager's predictive ability. Successful prediction of security price would enable the manger to earn higher returns than the ordinary investor expects to earn in a given level of risk. The basic model of Jensen is given below

$R_p = \alpha + \beta\,(R_m - R_f)$

R_p = average return of portfolio

R_f = riskless rate of interest

α = the intercept

β = a measure of systematic risk.

R_m = average market return

The return of the portfolio varies in the same proportion of β to the difference between the market return and riskless rate of interest. Beta is assumed to reflect the systematic risk. The fund's portfolio beta would be equal to one if it takes a portfolio of all market securities. The β would be greater than one if the fund's portfolio consists of securities that are riskier than a portfolio of all market securities. Figure 6.5 shows the relationship between beta and fund's return.

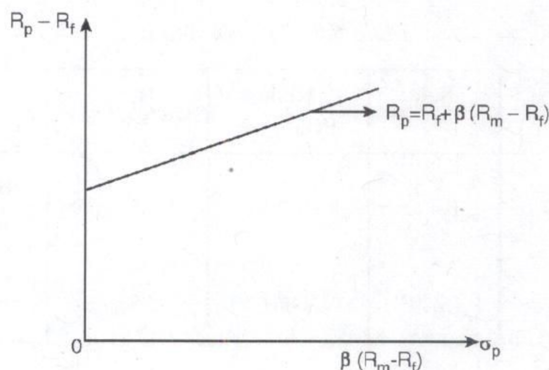


Fig. 6.5 Fund's Beta and Return

Any professional manager would be expected to earn average portfolio return of $R_p = R_f + \beta\ (R_m - R_f)$. If his predictive ability is superior, he should earn more than other funds at each level of risk. If the fund manager has consistently performed better than average R_p, there would be some constant factor that would make the actual return higher than average R_p. The constant may be α_p that represents the forecasting ability of the manager. Then the equation becomes

$$R_p - R_f = \alpha_p + \beta\ (R_m - R_f)$$

Or

$$R_p = \alpha_p + R_f + \beta\ (R_m - R_f)$$

By estimating this equation with regression technique, Jensen claimed α_p, the constant, reflected the professional management's ability to forecast the price movements. A comparative analysis of three hypothetical funds A, B and C are given in Figure 6.6.

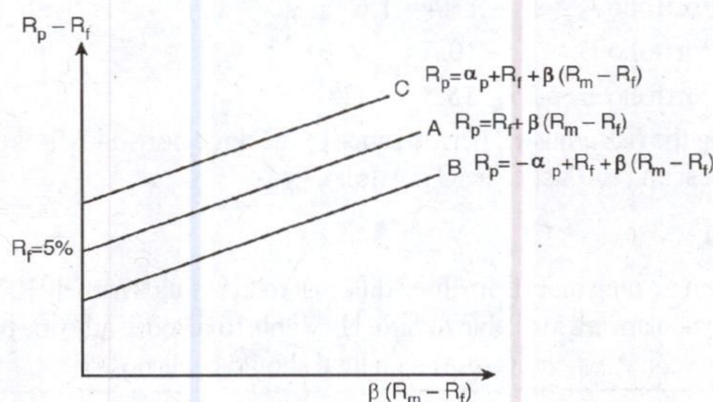


Fig. 6.6 *Jensen's Measure of Management Ability*

Fund A's α_p is equal to the risk free rate of return. If no risk is undertaken, the portfolio is expected to earn at least R_f. It is hypotheiszed that it takes no particular professional managerial ability to increase the return R_p by increasing $(R_m - R_f)$. In the fund C, the manager's predictive ability has made him earn more than R_f. The fund manager would be consistently performing better than the fund A. At the same time if the professional management has not improved, it would result in a negative α_p. This is shown by the line B. Here the α_p is even below the riskless rate of interest. Jensen in his study of 115 funds, he found out that only 39 funds possessed positive α and employing professional management has improved the expected return. On an average, fund's performance is worse than expected, without professional management and if any investor is to purchase fund's shares, he must be very selective in his evaluation of management. Thus, Jensen's evaluation of portfolio performance involves two steps:

1. Using the equation the expected return should be calculated.
2. With the help of β, R_m and R_f, he has to compare the actual return with the expected return. If the actual return is greater than the expected return, then the portfolio is considered to be functioning in a better manner. Table 6.3 gives the portfolio return and the market return. Rank the performance.

NOTES

Table 6.3 *Portfolio Return and Market Return*

Portfolio	R_p	b	R_f
A	15	1.2	5%
B	12	0.8	5%
C	15	1.5	5%
Market Index	12	1.0	5%

The return can be calculated with the given information using the formula:

$$R_p = R_f + \beta (R_m - R_f)$$

Portfolio A = 5 + 1.2 (12–5) = 13.4

Portfolio B = 5 + 0.8 (12–5) = 10.6

Portfolio C = 5 + 1.5 (12–5) = 15.5

The difference between the actual and expected return is compared.

Portfolio A = 15 – 13.4 = 1.6

Portfolio B = 12 – 10.6 = 1.4

Portfolio C = 15 – 15.5 = – 0.5

Among the risk adjusted performance of the three portfolios, A is the best, B is the second best and the last is the C portfolio.

Example 6.1

Mr. X has been owning units from three different mutual funds namely R, S and T. The following particulars are available to him. He wants to dispose any one of the mutual fund for his personal expenditure. Which fund should he dispose?

Funds	Excess Average Return	Beta
R	7.7	1.02
S	11.3	.99
T	11.6	1.07
Market	7.8	1.00

Solution:

The performance can be evaluated by finding out the differential return.

$$R_p - R_f = \alpha_p + \beta (R_m - R_f) \text{ (or)}$$
$$R_p = \alpha_p + \beta_f + b (R_m - R_f)$$

Portfolio R

$$\alpha_p = (R_p - R_f) - \beta_p (R_m - R_f)$$
$$= 7.7 - 1.02 \times 7.8$$
$$= -.256.$$

Portfolio S

$$\alpha_p = 11.3 - .99 \times 7.8$$
$$= 3.578$$

Portfolio C

$$\alpha_p = 11.6 - 1.07 (7.8)$$
$$= 3.254$$

Check Your Progress

1. Name the components, a portfolio return consists of?
2. What is Jensen's measure?
3. What are the common methods of comparing the portfolio returns?

Since the Portfolio R has a negative alpha value Mr. X can sell the portfolio R and keep the other two.

For ranking purpose, Jensen measure should be properly adjusted. Each assest's alpha value should be divided by its beta coefficient.

NOTES

6.3 PORTFOLIO REVISION: NEEDS AND METHODS

The portfolio management process needs frequent changes in the composition of stocks and bonds. In securities, the type of securities to be held should be revised according to the portfolio policy. If the policy of investor shifts from earnings to capital appreciation, the stocks should be revised accordingly. An investor can sell his shares if the price of shares reaches the historic high prices. Likewise, if the security does not fulfill the investor's expectation regarding return and growth, it is better to get rid of it. The investor should also consider the factors like risk, quality and tax concessions. If another stock offers a competitive edge over the present stock, investment should be shifted to the other stock. Many investors find themselves inadequate in their ability to trade and earn profit. Mechanical methods are adopted to earn better profit through proper timing. Such type of mechanical methods are Formula Plans and Swaps.

Passive management

Passive management is a process of holding a well diversified portfolio for a long term with the buy and hold approach. Passive management refers to the investor's attempt to construct a portfolio that resembles the overall market returns. The simplest form of passive management is holding the index fund that is designed to replicate a good and well defined index of the common stock such as BSE-Sensex or NSE-Nifty. The fund manager buys every stock in the index in exact proportion of the stock in that index. If Reliance Industry's stock constitutes 5% of the index, the fund also invests 5% of its money in Reliance Industry stock.



Passive management: Passive management is a process of holding a well diversified portfolio for a long term with the buy and hold approach

The problem in the index fund is the transaction cost. If it is NSE-Nifty, the manager has to buy all the 50 stocks in market proportion and cannot leave the stocks with smallest weights to save the transaction costs. Further, the reinvestment of the dividends also poses a problem. Here, the alternative is to keep the cash in hand or to invest the money in stocks incurring transaction cost. Keeping away the stock of smallest weights and the money in hand fail to replicate the index fund in the proper manner. The commonly used approaches in constructing an index fund is as follows:

1. Keeping each stock in proportion to its representation in the index
2. Holding a specified number of stocks for example 20, which historically track the index in the best manner.
3. Holding a smaller set of stocks to match the index in a pre-specified set of characteristics. This may be in terms of sector, industry and the market capitalisation.

Active management

Active management is holding securities based on the forecast about the future. The portfolio managers who pursue active strategy with respect to market components are



Active management: Active management is holding securities based on the forecast about the future

NOTES

called 'market timers'. The portfolio managers vary their cash position or beta of the equity portion of the portfolio based on the market forecast. The managers may indulge in 'group rotation's. Here, the group rotation means changing the investment in different industries' stocks depending on the assessed expectations regarding their future performance.

Stocks that seem to be best bets or attractive are given more weights in the portfolio than their weights in the index. For example, Information Technology or Fast Moving Consumer Goods industry stocks may be given more weights than their respective weights in the NSE-50. At the same time, stocks that are considered to be less attractive are given lower weights compared to their weights in the index. Here, the portfolio manager may either remain passive with respect to market and group components but active in the stock selection process or he may be active in the market, group and stock selection process.

6.3.1 The Formula Plans

The formula plans provide the basic rules and regulations for the purchase and sale of securities. The amount to be spent on the different types of securities is fixed. The amount may be fixed either in constant or variable ratio. This depends on the investor's attitude towards risk and return. The commonly used formula plans are rupee cost averaging, constant rupee value, the constant ratio and the variable ratio plans. The formula plans help to divide the investible fund between the aggressive and conservative portfolios.

The aggressive portfolio consists more of common stocks which yield high return with high risk. The aggressive portfolio's return is volatile because the share prices generally fluctuate. The conservative portfolio consists of more bonds that have fixed rate of returns. It is called conservative portfolio because the return is certain and the risk is less. The conservative portfolio serves as a cushion for the volatility of the aggressive portfolio. The capital appreciation in the conservative portfolio is rather slow and the fall in price of the bond or debenture is also alike.

Assumptions of the formula plan

1. The first assumption is that certain percentage of the investor's fund is allocated to fixed income securities and common stocks. The proportion of money invested in each component depends on the prevailing market condition. If the stock market is in the boom condition lesser funds are allotted to stocks. Perhaps it may be a ratio of 80 per cent to bonds and 20 per cent to stocks in the portfolio. If the market is low, the proportion may reverse. In a balanced fund, 50 per cent of the fund is invested in stocks and 50 per cent in bonds.
2. The second assumption is that if the market moves higher, the proportion of stocks in the portfolio may either decline or remain constant. The portfolio is more aggressive in the low market and defensive when the market is on the rise.
3. The third assumption is that the stocks are bought and sold whenever there is a significant change in the price. The changes in the level of market could be measured with the help of indices like BSE-Sensitive Index and NSE-Nifty.

4. The fourth assumption requires that the investor should strictly follow the formula plan once he chooses it. He should not abandon the plan but continue to act on the plan.
5. The investors should select good stocks that move along with the market. They should reflect the risk and return features of the market. The stock price movement should be closely correlated with the market movement and the beta value should be around 1.0. The stocks of the fundamentally strong companies have to be included in the portfolio.

NOTES

Advantages of the formula plan

- Basic rules and regulations for the purchase and sale of securities are provided.
- The rules and regulations are rigid and help to overcome human emotion.
- The investor can earn higher profits by adopting the plans.
- A course of action is formulated according to the investor's objectives.
- It controls the buying and selling of securities by the investor.
- It is useful for taking decisions on the timing of investments.

Disadvantages

- The formula plan does not help the selection of the security. The selection of the security has to be done either on the basis of the fundamental or technical analysis.
- It is strict and not flexible with the inherent problem of adjustment.
- The formula plan should be applied for long periods, otherwise the transaction cost may be high.
- Even if the investor adopts the formula plan, he needs forecasting. Market forecasting helps him to identify the best stocks.

6.3.2 Rupee Cost Averaging

The simplest and most effective formula plan is rupee cost averaging. First, stocks with good fundamentals and long term growth prospects should be selected. Such stocks' prices tend to be volatile in the market and provide maximum benefit from rupee cost averaging. Secondly, the investor should make a regular commitment of buying shares at regular intervals. Once he makes a commitment, he should purchase the shares regardless of the stock's price, the company's short term performance and the economic factors affecting the stock market.



Rupee cost averaging plan: the investor buys varying number of shares at various points of the stock market cycle

In the **rupee cost averaging plan**, the investor buys varying number of shares at various points of the stock market cycle. In a way, it can be called time diversification. Let us assume that an investor decides to buy ₹ 1000 worth of particular shares for four quarters in one particular year, ignoring the transaction costs. The details are given in Table 6.4.

NOTES

Table 6.4 Rupee Cost Averaging

Quarter	Market Price	Shares Purchased	Cumulative Investment	Market Value (In ₹)	Unrealised Profit or Loss	Average Cost Per Share	Average Market Price Per Share
1.	100	10	1,000	1,000	0	100	100
2.	90	11	1,990	1,890	(100)	94.76	95
3.	100	10	2,990	3,100	110	96.45	96.67
4.	110	9	3,980	4,400	420	99.50	100

In the above example, the stock price fell in the second quarter but recovered in the third quarter.The investor was able to buy more stocks in the second quarter than in the first quarter.The benefits of this policy can be viewed by comparing the last two columns. In the second quarter, the average cost per share is lower than the average market price per share. This is the benefit derived from rupee cost averaging.

The rupee cost averaging for the Hero Honda stock is given in Table 6.5. The process of investment is assumed to commence in January 1996 and end in 1998, covering 12 quarters.

Advantages

The advantages of the rupee cost averaging plan are

1. Reduces the average cost per share and improves the possibility of gain over a long period.
2. Takes away the pressure of timing the stock purchase from investors
3. Makes the investors to plan the investment programme thoroughly on the commitment of funds that has to be done periodically
4. Applicable to bothfalling and rising market, although it works best if the stocks are acquired in a declining market.

In a nut shell, the investor must decide in advance the sum and periodic intervals at which he has to invest. Once it is decided, the implementation is mechanical.

Limitations

1. Extra transaction costs are involved with small and frequent purchase of shares
2. The plan does not indicate when to sell. It is strictly a strategy for buying
3. It does not eliminate the necessity for selecting the individual stocks that are to be purchased
4. There is no indication of the appropriate interval between purchases
5. The averaging advantage does not yield profit if the stock price is in a downward trend
6. The plan seems to work better when stock prices have cyclical patterns.

The rupee cost averaging plan yields better results when applied to no load mutual funds. The problems of high transaction costs and stock selection are eliminated. The broad based index fund experiences profit if the price is volatile, allowing the averaging effect to result in cost reduction. The investor has only to decide on the size of the fund and the length of the interval between the purchases.

NOTES

Table 6.5 *Rupee Cost Averaging for Hero-Honda Stock*

Quarters	Price (₹)	Shares Bought	Total Number of Shares	Investment (₹)	Cumulative investment (₹)	Market Value (₹)	Unrealised profits (₹)	Average Cost (₹)	Average Price (₹)
15.1.96	112	90	90	10080	10080	10080		112	112
15.4.96	142.50	70	160	9975	20055	22800	2745	125	127
15.7.96	162.00	62	222	10044	30099	35964	5865	136	139
15.10.96	130.00	77	299	10010	40109	38870	(1239)	134	137
15.1.97	152.00	66	365	10032	50141	55480	5339	137	140
7.4.97	156.50	64	429	10016	60157	67139	6982	140	143
15.7.97	301.75	33	462	9958	70115	139409	69294	152	165
15.10.97	381.88	26	488	9929	80044	186357	106313	164	192
15.1.98	390.75	26	514	10160	90204	200846	110642	176	214
15.4.98	606.25	16	530	9700	99904	321313	221409	189	254
15.7.98	443.50	23	553	10201	110105	245256	135151	199	271
15.10.98	571.00	17	570	9707	119812	325470	205658	210	296

col 7 = col 2 × col 4
col 8 = col 7 – col 6
col 9 = col 6 ÷ col 4
col 10 = I Qr price + II Qr Price ÷ 2 and so on.

NOTES

6.3.3 Constant Rupee Plan

Constant rupee, constant ratio and variable ratio plans are considered to be true formula timing plans. These plans force the investor to sell when the prices rise and purchase as prices fall. Forecasts are not required to guide buying and selling.The actions suggested by the formula timing plan automatically help the investor to reap the benefits of the fluctuations in the stock prices.

The essential feature of this plan is that the portfolio is divided into two parts, which consists of aggressive and defensive or conservative portfolios. The portfolio mix facilitates the automatic selling and buying of bonds and stocks.

The plan

The constant rupee plan enables the shift of investment from bonds to stocks and vice-versa by maintaining a constant amount invested in the stock portion of the portfolio. The constant rupee plan starts with a fixed amount of money invested in selected stocks and bonds. When the price of the stocks increases, the investor sells sufficient amount of stocks to return to the original amount of the investment in stocks. By keeping the value of aggressive portfolio constant, remainder is invested in the conservative portfolio.

The investor must choose action points or revaluation points. The action points are the times at which the investor has to readjust the values of the stocks in the portfolio. Stocks' values cannot be continuously the same and the investor has to be watchful of the market price movements. Stocks' value in the portfolio can be allowed to fluctuate to a certain extent. Percentage change in price like 5%, 10% or 20% can be fixed by the investor. Allowing only small percentage change would result in a lot of transaction cost and would not be beneficial to the investor. If the action points are too large, the investor may not be able get full benefit out of the price fluctuations. The Table 6.6 shows the constant rupee plan. The transaction costs are not considered.

Table 6.6 *Constant Rupee Plan*

Period	*Market Price (₹)*	*Number of Shares*	*Value of StockPortfolio (₹)*	*Value of Defensive Portfolio (₹)*	*Total (₹)*
1.	50	200	10,000	10,000	20,000
2.	44	200	8,800	10,000	18,800
3.	40	200	8,000	10,000	18,000
4.	40	250	10,000	8,000	18,000
			Bought 50 Shares		
5.	44	250	11,000	8,000	19,000
6.	50	250	12,500	8,000	20,500
7.	50	200	10,000 Sold 50 Shares	10,500	20,500

According to the Table 6.6, the investor has ₹20,000 to invest and he divides it equally between stocks and bonds 50:50 that is 10,000:10,000. He makes quarterly adjustment if the stock portion falls or rises by 20%. In the third quarter, the stock prices fell by 20% initiating the action. He shifted ₹2000 from the bonds' portion and bought 50 shares. This lifted the value of stock portion again to ₹10,000.

In the fifth quarter, the stock price has increased from ₹40 to ₹50, a 20 per cent increase. In this action point the investor disposes off the shares and shifts the money to the bond portion. By this the stock amount in the portfolio has remained constant but the total portfolio value has increased. The investor stands to gain by the total portfolio value appreciation.

The major advantage of this plan is that purchase and sales are determined automatically. This facilitates the investor to earn capital gain by selling the stocks when the price increases and buying it at a relatively lower price. To make the plan operate effectively, at the starting point, stocks should not be purchased either at high prices or at too low prices. If the investor starts the purchase at the extreme price level, the stock fund may be either too small or too large.

Constant ratio plan

Constant ratio plan attempts to maintain a constant ratio between the aggressive and conservative portfolios. The ratio is fixed by the investor. The investor's attitude towards risk and return plays a major role in fixing the ratio. The conservative investor may like to have more of bond and the aggressive investor, more of stocks. Once the ratio is fixed, it is maintained as the market moves up and down. As usual, action points may be fixed by the investor. It may vary from investor to investor. As in the previous example, when the stock price moves up or down by 10 to 20 per cent action would be taken. Here, 10 per cent is taken as action point. The Table 6.7 shows the constant ratio plan.



Constant ratio plan: Constant ratio plan attempts to maintain a constant ratio between the aggressive and conservative portfolios

***Table 6.7** Constant Ratio Plan*

Market Price	*Number of Shares in Stock Portion*	*Value of Stock Portfolio (₹)*	*Value of Defensive Value (₹)*	*Total Portfolio (₹)*	*Ratio of Stock portion to Defensive Portion*
50	100	5000	5000	10,000	1.00
48	100	4800	5000	9,800	0.96
45	100	4500	5000	9,500	0.90
₹ 248 transferred from bond portion and 5.5 shares purchased					
45	105.5	4748	4752	9,500	1.00
40.5	105.5	4273	4752	9,025	0.90
Bought 5.9 shares by transferring ₹ 239 from bond portion.					
40.5	111.4	4512	4511	9,023	1.00
44.5	111.4	4957	4511	9,468	1.10
5 shares are sold and invested in bonds to make the ratio equal 1:1					

NOTES

The advantage of constant ratio plan is the automatism with which it forces the manager to counter adjust his portfolio cyclically. But this approach does not eliminate the necessity of selecting individual security.

The limitation of the plan is that the money is shifted from the stock portion to bond portion. Bond is also a capital market instrument and responds to market pressures. Bond and share prices may both rise and fall at the same time. In the downtrend both prices may decline and then gain.

Variable ratio plan

According to this plan, at varying levels of market price, the proportions of the stocks and bonds change. Whenever the price of the stock increases, the stocks are sold and new ratio is adopted by increasing the proportion of defensive or conservative portfolio. To adopt this plan, the investor is required to estimate a long term trend in the price of the stocks. Forecasting is very essential to this plan. When there is a wide fluctuation variable ratio plan is useful. The Table 6.8 explains the variable ratio plan.

Table 6.8 *Variable Ratio Plan*

Share Price (Rs)	*Value of Stock portion (₹)*	*Value of Defensive (₹)*	*Total Portfolio Value (₹)*	*Stock as a Percentage of Portfolio (₹)*	*Portfolio Adjustment*	*Shares in Stock Portion (₹)*
100	10,000	10,000	20,000	50.00	-	100
90	9,000	10,000	19,000	47.37	-	100
80	8,000	10,000	18,000	44.4	-	100
80	12,640	5,400	18,040	70.06	Bought 58 Shares	158
90	14,220	5,400	19,620	72.48	-	158
100	15,800	5,400	21,200	74.53	Sold 50 Shares	158
100	10,800	10,800	21,600	50.00	-	108

In the above example, the portfolio is adjusted for every 20 per cent change in the stock price. This adjustment criterion may be different for different investors depending upon their attitude towards risk and return. The portfolio is divided into two equal portions as in the case of other plans, with ₹10,000 in each. Let us assume that there is a fall in the price of the stock, then, the percentage of stock in the portfolio declines. As the market price for the stock reaches a 20 per cent decline, that is to ₹80, the adjustment action takes place. The purchase of 58 shares raises the stock portion to 72.48 per cent. Once again, when there is a 20 per cent change, the adjustment action is triggered. When the prices have increased to ₹100, the investor sells 50 shares and the stock portion in the portfolio is reduced back to 50 per cent.

The Figure 6.7 explains the variable ratio plan. The middle line is the trend line that represents the investor's expectation about of future course of prices. Zone 1 and 3 represent respectively of 10 and 20 per cent deviations above the expected trend, and zones 2 and 4 represent respectively 10 and 20 per cent deviations below the expected trend. Starting at ₹50, the portfolio's bonds and stocks ratio is 50:50. At point A, the portfolio is adjusted to the next proportion, in this case 60 per cent bonds and 40 per cent stocks. At B, again it is 50:50. Below point C there would be more stocks than bonds. Because of the decline in stock price, more stocks are purchased. Above the point D, it is again 50:50. The line moves closer to the trend line.

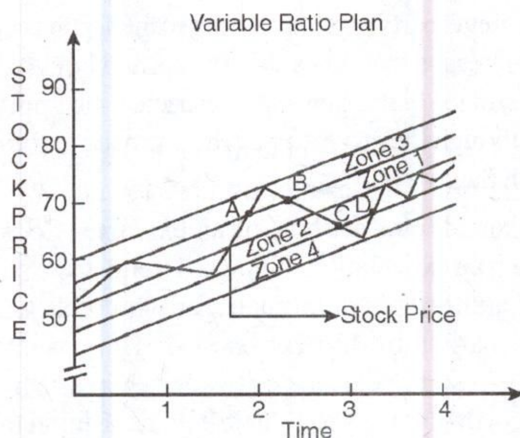


Fig. 6.7

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Advantages Automatically the investor tends to correct his portfolio portions according to the price changes. The investor is not emotionally affected by the price changes in the market. With accurate forecast the variable ratio plan takes greater advantage of price fluctuations than the constant ratio plan.

Limitations

1. The investor has to construct the appropriate zones and trend for alterations of the proportions
2. The selection of security has to be done by the investor by analysing the merits of the stock. The plan does not help in the selection of scrips.
3. If the zones are too small frequent changes have to be done and it would limit portfolio performance.

6.3.4 Revision and the Cost

With the passage of time the stocks which were attractive once may turn out to be less attractive in terms of return. The investor's attitude towards risk and return also may change and the forecast regarding the market also may undergo change. In this context, the necessary revision is thought of by the portfolio manager. In revision of traded volumes the portfolio manager has to incur brokerage commission, price impact and bid-ask spread. Price impact means the effects on the price of stock. In simple terms, if the size of the trade is heavy on the buying side, the prices of the stock may increase. The bid-ask spread is the difference between the price that the market maker is willing to buy and sell the stock. These costs may be higher in small size stocks and the benefits of revision may be nullified by it. Usually revision is done with the view of either increasing the expected return of the portfolio or to reduce the risk (standard deviation) of the portfolio.

6.3.5 Swaps

Swap is a contract between two parties to exchange a set of cash flows over a pre-determined period of time. The two parties are known as counter parties. In an equity swap one counter party, say 'A', agrees to pay cash based on the rate of return of an agreed stock market index to the second counter party 'B'. Since the payments are based on the market index, they vary according to index movements. The second counter party B agrees to pay the fixed amount of cash payments based on the current



Swap: A contract between two parties to exchange a set of cash flows over a pre-determined period of time

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interest rate to the first counterparty A. Thus, the payment depends upon the underlying security. This agreement means that A has sold stocks and bought bonds while B has sold bonds and bought stocks. Here, they have restricted their portfolios without the transaction costs, even though they have to pay the swap fee to the swap bank that set up the contract between the two parties.

This can be explained with the help of an example. Consider Mr. Hope, a portfolio manager having an expectation of upward trend in the stock market for the year and Mr. Despair, another portfolio manager who feels that there would be downward trend in the market for the next year. Mr. Hope wants to sell ₹10 lakhs worth of bonds and to invest it in the stock market, whereas Mr. Despair wants to dispose off ₹10 lakhs worth of stocks to be invested in the bond market. Selling and buying of bonds or stocks involve transaction cost. Hence, they approach the Swap bank. A contract has been set up between Mr. Hope and Mr. Despair by the swap bank. The contract payments have to be made for every quarter. At the end of each quarter, Mr. Despair has to pay Mr. Hope an amount equal to the rate of return on the NSE-Nifty for every quarter in terms of the basic principal amount. At the same time, Mr. Hope has to pay an amount equal to 3% of the principal. The agreed notional principal amount is ₹10 lakhs. The contract lasts for an year. They pay fees to the swap bank.

Let us assume that the rates of return of NSE-Nifty are 5%, - 2%, 3% and 6% for the four quarters. Mr. Hope has to pay ₹30,000 to Mr. Despair each quarter, the payments Mr. Despair has to make to the Mr. Hope are as follows:

Table 6.9

		Mr. Hope's Cashflows			*Mr. Despair Cashflows*		
Quarter	*NSE-Nifty Return*	*Payment From Despair (₹)*	*Payment To Despair (₹)*	*Net outflows (₹)*	*Payment From Hope (₹)*	*Payment To Hope (₹)*	*Net outflows (₹)*
First	5%	50,000	30,000	−20,000	30,000	50,000	20,000
Second	−2%	−20,000	30,000	50,000	30,000	− 20,000	−50,000
Third	3%	30,000	30,000	00000	30,000	30,000	00,000
Fourth	6%	60,000	30,000	−30,000	30,000	60,000	30,000

The results can be summarised

First Quarter : Mr. Despair pays Rs.20,000 to Mr.Hope

Second Quarter : Mr. Hope pays Rs.50,000 to Mr. Despair

Third Quarter : There is no payment

Fourth Quarter : Mr. Despair pays Rs.30,000 to Mr. Hope

The amount paid by Mr. Despair shows what would have transacted if Mr. Despair had sold stocks and bought bonds. Likewise the payments made by Mr. Hope indicates what would have happened if he had sold bonds and bought stocks. The equity swaps could be modified based upon the index and the prevailing interest rates.

Check Your Progress

4. What is passive management?
5. What do you understand by active management?
6. What do formula plans provide?

6.4 PORTFOLIO AUDIT

The portfolio audit is designed to provide you with a thorough objective overview of your portfolio as it relates to your investment goals and risk tolerance. This analysis

addresses diversification of your portfolio, performance, fees, risks and potential advisor conflicts of interest.

Portfolio audit is designed to evaluate the following:

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Investment objectives

- Determination of current portfolio is in line with future expectations and needs of client
- Determination of the risk or standard deviation of the portfolio relative one's objective or risk tolerance
- Evaluation of bond holdings as to their risks and whether they are appropriately diversified

Asset allocation

- Evaluation of portfolio for asset class diversification

Corporate governance

- Outline of potential and existing conflicts of interest that the advisor/broker have relative to performing their jobs on behalf of the client
- Review advisors' legal filings and compliance issues throughout the last 24 months

Tax implications

- Evaluation of portfolio for asset class diversification

Portfolio performance

- Performance of the portfolio net of fees, relative to appropriate comparisons for the clients investment objectives.
- Performance of underlying investments in the portfolio such as funds and individual holdings
- Analysis of their performance relative to a benchmark or other comparable investment options

Underlying investments

- Evaluation of the underlying investment firms for compliance with regulators, portfolio manager departures and fundamental changes in the organizations. Flag portfolio investments where there is little transparency and associated risks.

6.5 SUMMARY

Some of the important concepts discussed in this unit are:

- Portfolio return is equivalent to the difference between the selling price of the financial asset and the purchase price of the asset.
- The Sharpe ratio is the measure of the performance of the portfolio compared to the risk taken.
- In Treynor's model, the ideal fund makes the intersection at 45° angle. The ideal fund is depicted to the left of 45° line.
- The simplest form of passive management is holding the index fund that is designed to replicate a good and well-defined index of the common stock such as BSE-Sensex or NSE-Nifty.

Check Your Progress

7. What is the purpose of designing the portfolio unit?
8. What does a portfolio audit evaluate?

- The advantage of constant ratio plan is the automatism with which it forces the manager to counter-adjust his portfolio cyclically. But this approach does not eliminate the necessity of selecting individual security.
- The portfolio audit is designed to provide you with a thorough objective overview of your portfolio as it relates to your investment goals and risk tolerance.
- Swap is a contract between two parties to exchange a set of cash flows over a pre-determined period of time.
- Constant ratio plan attempts to maintain a constant ratio between the aggressive and conservative portfolios.

6.6 ANSWERS TO 'CHECK YOUR PROGRESS'

1. The portfolio return consists of two components—Income for the current period and capital.
2. Jensen measure is an absolute risk adjusted return measure.
3. The common methods of comparing the portfolio returns are: Sharpe's ratio, Treynor's ratio and Jensen's Alpha.
4. Passive management is a process of holding a well-diversified portfolio for a long term with the buy and hold approach.
5. The active management is holding securities based on the future broadcast.
6. The formula plans provide the basic rules and regulations for the purchase and sale of securities.
7. The purpose of designing a portfolio unit is to provide a thorough objective overview of a portfolio as it relates to an investor's investment goals and risk tolerance.
8. A portfolio audit evaluates investment objectives, asset allocation, corporate governance, tax implications, portfolio performance and underlying investments.

6.7 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is swap?
2. Name the simplest and most effective formula plan.
3. What is a portfolio audit?
4. What do you understand by the index cost?
5. What is Treynor's risk premium of portfolio?

Long-Answer Questions

1. Critically explain the methods of measuring the portfolio risk-return.
2. What is formula plan? Discuss the assumptions of formula plan.
3. Describe rupee cost averaging and its advantages and limitations.
4. What is portfolio audit? What are its designing objectives? Elaborate.
5. What do you understand by portfolio revision? Explain.

MODEL QUESTION PAPER

MBA Degree Examination

Investment Analysis and Portfolio Management

Time: 3 Hours **Maximum: 100 Marks**

PART A (5 × 8 = 40 marks)

Answer any FIVE of the following:

1. Describe how speculation is different from gambling.
2. List the various investment avenues available to an investor.
3. How would you compute return on individual security and portfolio?
4. Describe any one model of return analysis.
5. Discuss the differences between industrial analysis and company analysis.
6. How would you interpret the Lagrange multiplier method?
7. What is the difference between the weak form, semi-strong form and strong-form of efficient market hypothesis?
8. Discuss the advantages of constant ratio plan.

PART B (4 × 15 = 60 marks)

Answer any FOUR of the following:

9. What are the various types of non-negotiable securities? Discuss their salient features.
10. Describe the characteristics features of futures, forwards, options and swaps.
11. Discuss the various methods of assessing the risks associated with individual security and portfolio.
12. Explain the various aspects of technical analysis.
13. Illustrate the method of calculating the minimum variance portfolio.
14. Explain the significance of Capital Market Line (CML) and Security Market Line (SML).
15. Describe how the performance indices of Sharpe, Treynor and Jensen can be judged.

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Master of Business Administration

Paper 4.2.2

Investment Analysis and Portfolio Management





ALAGAPPA UNIVERSITY

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